



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>G06F 17/21, 17/30</b>		<b>A1</b>	(11) International Publication Number: <b>WO 00/23912</b>
			(43) International Publication Date: 27 April 2000 (27.04.00)
(21) International Application Number: PCT/US99/24482		(US). LUTTMANN, Eric [US/US]; 5420 S. Cortez Place, Boise, ID 83709 (US).	
(22) International Filing Date: 20 October 1999 (20.10.99)		(74) Agents: MUNCY, Joe, McKinney et al.; Birch, Stewart, Kolasch & Birch, LLP, P.O. Box 747, Falls Church, VA 22040-0747 (US).	
(30) Priority Data: 09/175,905      20 October 1998 (20.10.98)      US		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).	
(71) Applicant (for all designated States except US): OCE-USA INC. [US/US]; 5450 North Cumberland, Chicago, IL 60656 (US).			
(72) Inventors; and (75) Inventors/Applicants (for US only): HICKS, Dennis, W. [US/US]; 3018 S. Whitepost Way, Eagle, ID 83616 (US). NEWMAN, Richard [US/US]; 5201 W. Pine Lane, Meridian, ID 83642 (US). JOHNSON, Gary [US/US]; 920 N. Maple Grove #G204, Boise, ID 83704 (US). O'TOOLE, Lisa [US/US]; 4695 Old Valley Road, Eagle, ID 83616 (US). HAY, David [US/US]; 2280 N. Maple Grove, Boise, ID 83704 (US). GYLLENSKOG, Chris [US/US]; 11915 W. Dickens Drive, Boise, ID 83709 (US). JOHNSON, Steven, C. [US/US]; 2540 N. Constance Place, Eagle, ID 83616 (US). STEPHENSON, Matt [US/US]; C1641 Indy Lane, Stratford, WI 54484 (US). HARTMANN, Frank [US/US]; 7061 Valley Heights Drive, Boise, Idaho 83709 (US). AS- BURY, Ray [US/US]; 10684 Albany Court, Boise, ID 83713			

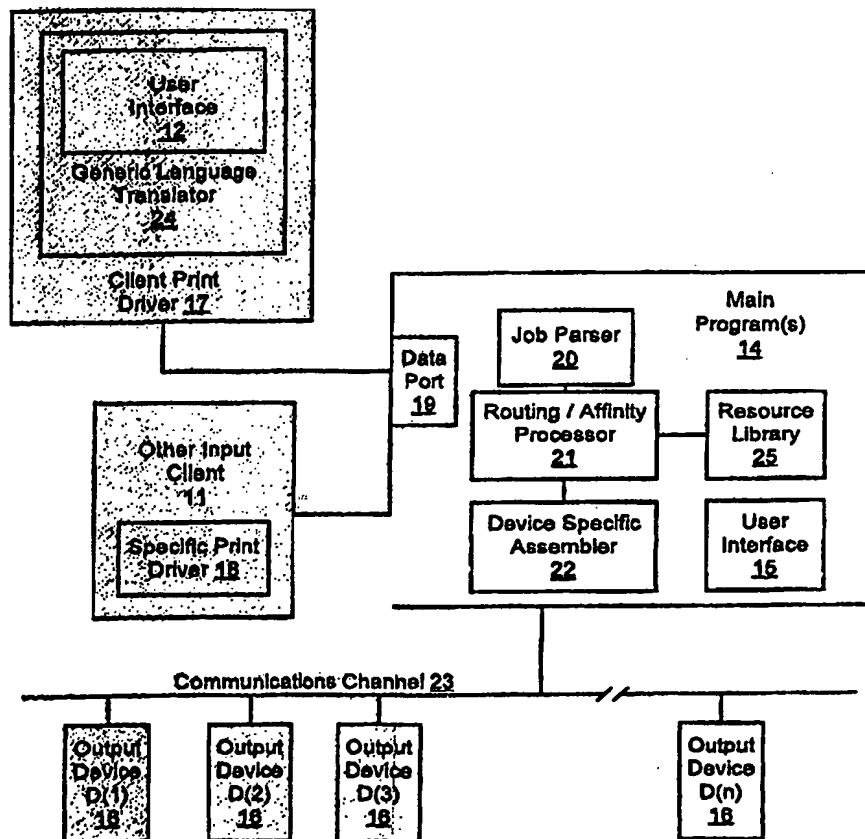
Published

With international search report.

(54) Title: NETWORK DOCUMENT DELIVERY SYSTEM

## (57) Abstract

A system of networked computers and peripherals and document delivery software which provides a user with a familiar simple user interface (12) to deliver documents to a variety of different destinations. Each document generation device participating in the system is provided with a unified print driver which translates an electronic document into a non-specific or printer independent printer language file and appends to this file a job ticket containing any other rendering characteristics which may not be supported by the printer independent language (24). This entire file is then transmitted to the system server which analyzes the file, including the rendering characteristics; determines the best output device(s); appends output device specific (18) commands to the general printer language file; and transmits this file to the device(s) for final output.



**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav	TM	Turkmenistan
BF	Burkina Faso	GR	Greece		Republic of Macedonia	TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

5 TITLE OF INVENTION: Network Document Delivery System

**INVENTORS:** Steven C. Johnson, Eagle, Idaho; Dennis W. Hicks, Eagle, Idaho; Richard D. Newman, Meridian, Idaho; Gary Johnson, Boise, Idaho; Lisa O'Toole, Eagle, Idaho; David Hay, Boise, Idaho; Chris Gyllenskog, Boise, Idaho; Matt  
0 Stephenson, Stratford, Wisconsin; Frank Hartmann, Boise, Idaho; Ray Asbury, Boise, Idaho; Eric Luttman, Boise, Idaho.

Microfiche Appendix: This specification has appended hereto a microfiche appendix having 17 fiche containing approximately 4800 frames.

5

**RELATED APPLICATIONS:** This application claims the priority of Provisional Application Serial No. 60/063,891 filed October 22, 1997.

## **DESCRIPTION**

10

### **BACKGROUND OF THE INVENTION**

**Technical Field.** This invention generally relates to document handling on a computer network, and more particularly, this invention relates to a recipient based system for printing, faxing, storing and transmitting electronic documents  
15 across networks.

**Background.** Modern business requires that computing environments become more flexible, easy to use, allow for growth, and in particular, be measurably cost effective. A fundamental element of computing environments is the handling of  
30 documents. The concept of a "document" is now much more than just a printed piece of paper. A document can be printed in both black and white and color, it can be viewed electronically, it can be archived on removable or fixed storage media, and it can be transmitted electronically. Unfortunately, the traditional mechanisms for delivering documents consist of independent solutions. This problem is  
35 characteristic of the current device based paradigm for document delivery. It would therefor be desirable to provide a single integrated solution which allows a network

2  
5 user to deliver his or her document to one or more different destinations or recipients  
in a single step regardless of the end form in which the document is presented.

### SUMMARY OF THE INVENTION

According to the present invention, this general end is achieved by a  
0 system of networked computers, peripherals and document delivery software which  
provides the user with a familiar simple user interface, such as a print dialog box in a  
Windows® environment, to deliver documents to a variety of different destinations,  
both within the network, across networks and outside of the network via remote links.

In one embodiment of the invention, a document generation device  
5 participating in the system, whether directly connected to the network or interacting  
full or part time through a remote link, may be provided with a print driver which  
translates an electronic document into a non-specific, or printer independent, printer  
language file and appends to this file a job ticket containing any other rendering  
characteristics which may not be supported by the printer independent language.  
0 Rendering characteristics include such things as color or monochrome output,  
duplex printing, number of original copies, stapling, collating, binding, recipient and  
destination information, etc. This entire file is then transmitted to the system server  
which analyzes the file, including the rendering characteristics; determines the best  
output device(s); appends output device specific commands to the general printer  
15 language file; and transmits this file to the device(s).

The job ticket and related flexibility of the software also enable recipient  
based delivery and result based delivery, both of which represent a paradigm shift  
away from device based printing. Recipient based delivery focuses upon the  
location of a particular recipient and the medium through which that recipient prefers  
30 to receive information, as opposed to a particular printer in the general location of the  
recipient. Result based delivery focuses on the presentation and medium for  
delivery of information, as opposed to a particular device or device location.

In one embodiment of the invention, the software on the server  
assigns an affinity value to each print job based upon the job size, destination and  
35 rendering characteristics. This affinity value is then used to determine which output

5 device(s) will receive the document. The server must therefor be aware of what  
output devices are participating in the system, where they are located, what their  
specific characteristics are and whether or not any particular device is currently  
available. This information may be gathered automatically by having the server poll  
for network resources, the information may be manually entered by a user or system  
0 administrator, or the information may be input by a combination of the two methods.  
The user may elect to bypass the invention by selecting a specific printer driver  
rather than that of the invention. In this case, the invention software on the server  
simply forwards the print job on to the specific printer requested.

This system facilitates the ability to implement many other valuable  
5 and desirable features. One such feature is the ability to distribute a large job over  
two or more output devices participating in the system, essentially defining multiple  
output devices as a single output device. This is most advantageous where a single  
job contains multiple original copies and each output device receives one or more  
entire copies to output, thereby decreasing output time by a factor of the number of  
10 output devices and not causing the user to collate pages from multiple output  
devices. Additionally, the invention can distribute jobs over the output resources on  
the network to even distribute the workload.

Another feature which may be implemented is an activity log or journal  
which can provide detailed information concerning usage. The log can provide such  
25 information as the size and number of print jobs requested by any combination of  
users for billing purposes; job completion verification; diagnostic information to allow  
an operator to determine when and why jobs failed; and resource utilization  
information such as toner usage for a printer to plan for inventory, expenses and  
maintenance. The journal may be kept in a standard database format which may be  
30 easily imported to accounting, database or other computer applications.

The invention can support virtually any output device such as:  
standard image forming devices including printers, plotters, and video; facsimile  
devices; email communications; data communications links; and archival devices. In  
the case of hard copy image forming devices such as a laser printer, both banner  
35 and receipt pages can be generated. Banner pages can be used to identify sets of

- jobs on each printer and notify the operator of any finishing operations to be performed. Receipt pages can be used to provide a short job summary and verify job completion. Supported data communications can include serial telecommunications via data modems, network communications using TCP/IP, NetBEUI, IPX/SPX and ETHERTALK. Supported storage devices for archival purposes as well as job submission, include floppy diskettes, IOMEGA JAZ drives and SYQUEST SYJET drives.

Advantageously, archival and storage of documents may be done in a platform independent format such as ADOBE's Portable Document Format (PDF). PDF allows a user of virtually any operating system to view and print archived documents using a freely distributed viewing program, ADOBE ACROBAT READER.

In another embodiment of the invention, the software on the server can be configured so that a job sent to a specific port or by a particular type of printer driver is always output the same way or according to a specific set of rules. This enables document generation devices to use a standard printer specific printer driver, such as a HEWLETT PACKARD LASERJET driver, and still have the job output to one or more different devices.

Additional advantages and novel features of the invention will be set forth in part in the description that follows, in the attached appendix and in part will become apparent to those skilled in the art upon examination of the following or may be learned by practice of the invention. The objects and advantages of the invention may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic representation of a network document delivery system according to the invention;

Fig. 2 is a block diagram illustrating the functional aspects of the software;

Fig. 3 is a graphic representation of the connections that may be made to a representative hardware system;

Fig. 4 is a graphic representation of a high level system object model of the invention;

Fig. 5 is a graphic representation of a subordinate level object model showing the relationship between a task and a job;

Fig. 6 is a graphic representation of a subordinate level object model showing the relationship between users and objects;

Fig. 7 is a graphic representation of a subordinate level object model showing the relationship between the general product and different types of output;

Fig 8 is a graphic representation of a subordinate level object model showing the relationship between a data source and the data port;

Fig. 9 is a graphic representation of a subordinate level object model showing the relationship between a general device, a pool of devices, an atomic device, a remote system, a system device and an array of devices;

Fig. 10 is a graphic representation of a subordinate level object model showing the hierarchical relationship between a system device and an atomic device;

Figs. 11 and 12 describe the general life cycle model and rely on the schemata of Figs. 13 through 55;

Fig. 56 describes the Fuslon notation used in Figs. 4 through 10;

Fig. 57 describes the Life Cycle Model notation used in Figs. 11 and 12;

Figs. 58 through 61 describe various notation schemes used in Figs. 62 through 66;

Fig. 62 is an object interaction graph illustrating how affinity is determined;

Fig. 63 is an object interaction graph illustrating the submit job sequence;

Fig. 64 is an object interaction graph illustrating the instruct to job ticket sequence;

Fig. 65 is an object interaction graph illustrating the instruct to instruction set sequence;

5                   Fig. 66 is an object interaction graph illustrating the normal execute sequence; and

                  Figs. 67 through 81 illustrate one possible graphical user interface for the job ticket and show some of the various delivery options.

### 0                   DETAILED DESCRIPTION OF THE INVENTION

                  Referring now to the figures, one possible network document delivery system, generally designated at 10 in the figures, according to the invention will be described in detail. The network shown includes at least one document generator 11, such as a networked personal computer, having a client user interface 12  
5   Installed therein; a server 13 having main job processing software 14 therein including a server user interface 15; and two or more document output devices 16. Fig. 3 shows a representative hardware connection configuration or network on which the invention may be implemented.

                  The simplified user model illustrated in Fig. 2 provides a procedural  
20   view of system operation. In this model, the overall system may include a main program 14, multiple data sources, such as client print driver 17, and/or other input clients, such as a manufacturer specific print driver 18, and multiple output devices 16.

                  A job is sent from a data source such as document generator 11 to  
25   main program 14 via a data port 19. A job must contain a data stream to be rendered, also referred to as image data, on some output device. The job may also contain a job ticket, which is a collection of specific information concerning the desired output presentation, such as a standard hard copy print job; a fax; an archival; an email; finishing features; routing information; and even billing  
30   information.

                  In the case, where print driver 17 is used, here when the user selects "auto" as the print destination, job ticket information is provided by client print driver 17. In this case print driver 17 includes a generic language translator 24 which translates an electronic document into a non-specific, or printer independent, printer  
35   language file and appends to this file a job ticket containing any other rendering



characteristics which may not be supported by the printer independent language. In other cases, the job information may be provided by 'default' job tickets or port profiles associated with a data port, a user name which can be determined from the network name, or a system default job ticket.

Job parser 20 examines the incoming job for a job ticket and applies default job tickets as required, then sends the job to routing and affinity process 21. Routing and affinity process 21 determines the capabilities required to complete the job successfully and the affinity of each potential output device for the job. Routing and affinity process 21 assigns an affinity value to each print job based upon the job size, destination and rendering characteristics by comparing the requested features with the available features logged in resource library 25. Available resources may be gathered and logged into resource library 25 by server 13 automatically by polling the network for resources. Additionally, the information may be manually entered by a user or system administrator or it may be input by a combination of the two methods. The job is then routed to a device specific assembler 22, also sometimes called the 'transform', to change the image data to a device specific form. The image data is then sent to the appropriate output device(s) 16 via a communications channel 23. In addition, the current status of each device can be monitored by the main program via communication channel 23.

Most commonly, output devices 16 are printers, but they can also be fax machines, electronic storage media, such as a 'file' on diskette, removable media, hard disk, tape drive, network drive, etc., or even email.

The simplified model can be extended to include multiple data ports with an associated default job ticket or port profile for each. A combination of port and port profile is referred to as a 'virtual queue'. Also, note that client print driver 17 can reside on the same host as main program 14, so that the operator of main program 14 can also submit jobs.

While the simplified user model illustrated in Fig. 2 provides a procedural view of system operation, the following illustrative embodiment takes advantage of the multitasking nature of a host operating system, such as WINDOWS

- 5 NT and the capabilities of object oriented programming techniques. This embodiment is illustrated in Fig. 4.

Here, the main program is actually a set of programs running simultaneously. Also, the job parsing, routing, and assembling functions are spread out over a set of objects. One possible set of object models are shown in Figs. 4 -

10. An explanation of the notation is included in Figs. 56 - 61, but in general, diamonds show relationships between models, and triangles denote hierarchy. For instance, referring to Fig. 5, a job is a task, and a job includes at least one document. Tasks may have one or more parent/child relationships. External agents, such as the human operator, are also represented by objects, even though the object may  
5 not have a corresponding software implementation.

Each of the objects shown in Fig. 4 can be decomposed or broken down into other objects as shown in the other figures. The objects enclosed within dashed lines are programs. The Operator, Recipient, and User are people as shown in Fig. 6. A Product is the output of the system as shown Fig. 7.

- 0 A job is created by a data source such as a document generator 11 and more specifically, usually by client print driver 17. Fig. 8 shows a more detailed view of possible types of data sources and their relationships to data ports. Note that remote systems can send jobs just like any local source. Likewise, a remote system may be configured as a device. This allows passing of a job from system to  
5 system, in a distributed network-like manner. The purpose for configuring the systems this way is to reduce phone charges by using local area network (LAN) communications between main systems. This allows jobs to be passed to LAN or phone connected printers, even though the printers are not available to the local system.

- 0 The data source passes the job to the data port. Note that everything inside the area surrounded by the dotted line, including the data port, are the main programs. The job parsing function is performed by the data port. The port creates a job object in the system that includes a document, i.e. image data, and job ticket as shown in Fig. 5. The job ticket may need to be formed from an associated port  
15 and/or user profile, i.e. a default job ticket. The job ticket is designed to allow routing

of the job to the best device and storing of data for billing and management purposes. The job ticket allows separation of the job specific features, such as number of copies, finishing, recipient information, etc., from the image data. Eventually job specific information needs to be in a form unique to each printer or output device, depending on its manufacturer and its configuration as it was installed, as some finishing features such as sorters and staplers are optional. The specialization of the generic or device independent data stream to the actual production device data stream is done after the production device is chosen by the system.

The data port creates a job and passes it to the system device. Fig. 9 shows the device hierarchy, and Fig. 10 shows the device relationships. There is only one system device in the system, and it is always the first device to receive each job. Every device examines the job to see if it can produce it, decompose it into tasks, or route it to a child device. Thus, the devices contain the routing function shown in the simplified model. All devices are implemented as objects. Device objects are serialized meaning configuration parameters are stored to disk so that they may be restored after a system reset.

A key feature of the device design is the relationship between pools, arrays, and atomic devices as illustrated in Fig. 10. A pool is generally a grouping of like devices. The grouping can be by function such as faxes, printers, or archive devices, or by some other criteria such as location, e.g. all printers on the second floor, permissions, or routing. An array is a collection of like devices. An atomic device represents the smallest whole constituent part. As far as the parent pool is concerned, an array is an atomic device, and thus the array class is derived from the atomic device class. At the lowest level, an atomic device 'knows' that it is capable of producing a product, and thus will determine its capabilities and will calculate an affinity for a given job. All devices are ultimately derived from a single device class. This design pushes specialization to the lowest possible level. If a device needs a particular resource to produce a product, fonts or electronic forms for example, it submits a request to the resource library.

5           Devices contain many of the unique features of the invention. As an example, arrays are defined as collections of devices which are capable of receiving and producing the desired output. The device hierarchy and built in routing capability allow arrays to break a job down into tasks, one task per copy. The separate tasks are sent to each of the devices constituting the array as each device is ready to receive it. Another example of a unique feature is the intelligent routing accomplished through capabilities and affinities. The logic for routing is built in to each atomic device. The pass/fail response on capabilities and affinity number for a task is passed to the parent device, which then compares the responses from each child device and sends the task to the appropriate device.

5           Another unique feature of the invention is intelligent translation of a job defined for one type of output device into another. Incoming jobs are often in a data stream that is incompatible with the best fit output device. The intelligent translation device performs the appropriate translation based upon a separate determination of the best fit output device. A current embodiment is capable of translating from POSTSCRIPT to various forms of HP-PCL and PDF.

5           Other unique features can include color separation where pages with color data are separated from a predominately black and white data stream and sent to a color printer. Most of the document will be printed on a black and white printer which generally has a lower cost per page than color printers. This feature can be implemented by configuring the client print driver to put page boundary markers in the source document data stream.

5           The resource library and activity log or journal are advantageously coded as separate systems running simultaneously with the main system. The activity journal may be a database containing various tables, entries, queries, and reports relevant to the system. The database interface can be provided by the operating system. The database and its schema, e.g. tables, queries, etc., are created at system startup if they don't already exist. Exemplary database tables might include: an ActionLog which contains system startup and configuration change information; a Billing log which contains originator billing information; a Company log which contains company address information; a FaxList log which relates fax

- 5 completion statistics to recipients; a Job log which contains Job Information, such as start time, stop time, originator, etc.; an Originator log which contains originator information such as address, phone number, etc.; a Recipient log which contains recipient address information; a Recipient list which relates jobs to recipients; a Task log which contains task information such as start time, stop time, production device, etc., and a device log which contains physical device information.

The operator user interface allows the operator to configure the main system for the needs of a particular installation, and is implemented as a separate program from the main system. The main system is capable of operating without the operator user interface running. The operator user interface also saves and loads job templates. Job templates are job tickets that have been saved for later use, and can be edited before submitting a job.

When the user selects "Auto" instead of a specific printer in the graphical user interface, the invention examines the job ticket information to route print jobs to the most effective printer. This feature may be disabled during configuration. If a specific printer is selected by the user, and the printer does not exist, then the job remains unassignable.

Each job is routed to a printer depending on whether the job can be printed at all, printer capabilities, and the best fit of additional performance or post-processing factors, i.e. the affinity of the job to a printer or printer to a job.

Devices have a subset of attributes that define the types of tasks that can be processed. If a task requests a function that is outside the set defined by the device's attributes, then the device is considered to be incapable of processing the task. The attributes include the range of number of pages allowed in a single task, the ability to print color or strictly black and white pages, the ability to print duplex, and the ability to support a requested paper size, color or weight. A task's requirements must fall within all of these restrictions. A task for which no capable devices can be found is considered "Unassignable".

In addition to the above attributes each device is given a unique name, and also has an indicator that specifies if the device should be a candidate during "Automatic Assignment". Automatic Assignment is device selection that is

- 5 Insensitive to the device's name. If Automatic Assignment is not allowed by a device, and the task does not request that device specifying its name specifically, then the device is considered Incapable. If a task requests a specific device, all devices that do not have the name requested are also considered incapable. If no device by the requested name is present in the system, or if no direct path to the requested device is present, then the task is changed to allow Automatic Assignment without regard for originally requested device name. If no device name is ever requested by the task, Automatic Assignment is assumed.

- Devices have another subset of attributes that define the device's ability to automate a number of processing options which include the device's processing performance, and the operator's preference toward device. The affinity value for a device is calculated by accumulating the individual affinities given by examining each of the individual attributes.

- The automation attributes include the device's ability to collate, to staple, to fold, to drill, to bind, and to add covers. If a task requests one of these functions, the devices that provide the function are given a higher affinity than those devices that do not provide the function. Additional automation functions supported by the device, that are not requested by the task, are simply ignored.

- The device's performance is given as a single Impressions Per Minute (IPM) value. The assumption is made that one minute is the optimal average amount of time that a device should spend processing a single task, and that thirty seconds is the standard deviation. A standard bell curve is used to assign relative affinities to each device for a given task.

- The operator's preference is given as a single value from one to ten. A higher value gives a higher affinity. Each of the above factors is weighted so that a priority relationship between them can be enforced. A higher priority factor will take precedence over any single factor with a lower priority, and the sum of all factors with lower priorities. The priority standings are as follows: 1) Collation; 2) Stapling; 3) Folding; 4) Stitching, Drilling, Binding, and Cover Insertion; 5) Operator Preference; 6) Cost; and 7) Performance

5           Array Pools and the devices under them have special routing issues.  
The capability and affinity rules described above must be adjusted to account for  
these issues. An array is capable of processing a task if any of the devices under it  
are capable of processing the task. There are two adjustments to the standard  
capability testing performed by the devices under the array. The allowable number  
0 of pages and the requested device name are tested at the array level, not at the  
subordinate device level. The page range is not used because it is not always  
known ahead of time how many pages each device in the array will print. The device  
name testing would allow a maximum of only one device to be capable of defeating  
the purpose of the array.

5           The affinity of an array can be determined by averaging all of the  
affinities of the capable and available subordinate devices. There is only one  
adjustment to the standard affinity calculations performed by the sub-devices. The  
device's performance is not factored into the result because, again, the page count  
for each device is not known. All other affinity factors are evaluated normally.

0           Figs. 11 through 55 describe a life cycle model of one embodiment of  
the invention. The life cycle model describes the order in which system operations  
may occur. The life cycle model, together with the system operation schemata  
shown specifically in Figs. 13 through 55, fully describe the behavior of the system.

5           The following rules apply to interpreting the life cycle model and  
schemata:

Alphabet. Any input or output event may be used in an expression. Output  
events are prefixed with #.

Operators. Let x and y be life-cycle expression, then:

- 1           x.y denotes x is followed by y.
- x|y denotes either x or y occurs.
- x\* denotes zero or more occurrences of x
- x~ denotes zero or more occurrences of x simultaneously
- [x] denotes that x is optional.
- 3           x||y means arbitrarily interleaving the elements of x and y.

5

14

Substitutions. An expression can be named in a substitution:

Name = Life-Cycle Expression

0

Name may be used in other expressions, but substitutions must not be recursive.

Operator precedence. In decreasing order the precedence is:

[], \*, +, ..., |, ||

5

Expressions may be bracketed to override default precedence.

The Operation models in the Life Cycle Model are done through textual schemata. Each schema within the schemata shown in Figs. 13 through 55 lists seven sections: (1) Operation - the name of the system operation being described; (2) Description - a free-form abstract of the intent of the operation; (3) Reads - a list of values that are accessed but not changed by the operation; (4) Changes - a list of values that may be modified by the operation; (5) Sends - output events sent by the operation to objects outside the systems (these objects are known as agents); (6) Assumes - a list of conditions that are assumed as being true when the operation begins (if the conditions are not true and the operation is invoked, then the operation's actions and results are undefined); and (7) Result - the conditions and changes in state that are true when the operation has completed.

The recipient and result based paradigms mentioned earlier can be better understood making reference to Figs. 67 - 81. In the recipient based paradigm, a user simply selects the recipient from the recipient list as is shown in Fig. 67. The information is then delivered to that recipient based upon the recipient's preferred device or devices. New recipients can be defined by entering the new recipient's information, such as that shown in Figs. 68 - 70, or possibly as a result of that particular recipient joining the system as a new user by entering new user information, such as that shown in Figs. 71 - 73. Printing and delivery options can



be selected by entering in the desired characteristics on the job ticket such as those shown in Figs. 74 - 81.

The result oriented delivery paradigm is more of an inherent result of the design of the invention and is directly related to the affinity feature and a device's capability to produce the requested output. Prior to this invention, output characteristics beyond the capability of a particular output device either simply were not presented as available options to the user or were altered, usually by being eliminated altogether, by the device specific print driver as the job was output. With the flexibility of this invention and ability to alter the affinity weighting, all or some of the paradigms can be implemented to whatever degree is desired.

While there is shown and described certain embodiments of the invention, it is to be distinctly understood that this invention is not limited thereto but may be variously embodied to practice within the scope of the following claims.

We claim:

1. A system for delivering documents across a network which  
comprises:
  - a document generator configured to output a data stream in a device independent format;
  - a computer configured to receive the device independent format data stream and programmed to analyze the data stream to determine a best output device by comparing any features required by the data stream with features of any output devices available to the computer; and
  - the computer further being programmed to translate the device independent data stream into a device specific data stream for the best output device and to transmit the device specific data stream to the best output device.
2. The system of claim 1 wherein the document generator is further configured to embed data into the data stream indicative of a job ticket containing information including rendering characteristics for a generated document and at least one task.
3. The system of claim 2 wherein the computer is further programmed to determine a best output device based upon an affinity value for each output device and whether a particular output device is capable of producing what the data stream requires.
4. The system of claim 1 wherein the computer is further programmed to determine a best output device based upon an affinity value for each output device and whether a particular output device is capable of producing what the data stream requires.
5. The system of claim 4 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to

transmit at least a portion of the data stream<sup>17</sup> to each of the commonly capable output devices.

6. The system of claim 3 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit at least a portion of the data stream to each of the commonly capable output devices.

7. The system of claim 2 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit at least a portion of the data stream to each of the commonly capable output devices.

8. The system of claim 1 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit at least a portion of the data stream to each of the commonly capable output devices.

9. The system of claim 6 wherein the computer is programmed to assign, for every data stream, an affinity value to each output device; compare each available output device based upon each of the output devices abilities and any rendering characteristics required by a particular data stream; and to transmit the data stream to an output device which has a highest affinity value.

10. The system of claim 5 wherein the computer is programmed to assign, for every data stream, an affinity value to each output device; compare each available output device based upon each of the output devices abilities and any rendering characteristics required by a particular data stream; and to transmit the data stream to an output device which has a highest affinity value.

11. The system of claim 4 wherein the computer is programmed to assign, for every data stream, an affinity value to each output device; compare each available output device based upon each of the output devices abilities and any rendering characteristics required by a particular data stream; and to transmit the data stream to an output device which has a highest affinity value.

12. The system of claim 3 wherein the computer is programmed to assign, for every data stream, an affinity value to each output device; compare each available output device based upon each of the output devices abilities and any rendering characteristics required by a particular data stream; and to transmit the data stream to an output device which has a highest affinity value.

13. The system of claim 12 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

14. The system of claim 11 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

15. The system of claim 10 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

16. The system of claim 9 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

17. The system of claim 8 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

18. The system of claim 7 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

19. The system of claim 6 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

20. The system of claim 5 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

20.

21. The system of claim 4 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

22. The system of claim 3 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

23. The system of claim 2 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

24. The system of claim 1 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

1 25. The system of claim 23 wherein embedded data includes  
2 multiple tasks and each of the tasks is destined for a different output device.

1 26. The system of claim 22 wherein embedded data includes  
2 multiple tasks and each of the tasks is destined for a different output device.

27. The system of claim 19 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

28. The system of claim 18 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

29. The system of claim 16 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

30. The system of claim 13 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

31. The system of claim 12 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

32. The system of claim 9 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

33. The system of claim 7 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

34. The system of claim 6 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

35. The system of claim 3 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

36. The system of claim 2 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

37. The system of claim 36 further comprising an output device which is a separate system for delivering documents across a network.

38. The system of claim 35 further comprising an output device which is a separate system for delivering documents across a network.

39. The system of claim 34 further comprising an output device which is a separate system for delivering documents across a network.

40. The system of claim 33 further comprising an output device which is a separate system for delivering documents across a network.

41. The system of claim 32 further comprising an output device which is a separate system for delivering documents across a network.

42. The system of claim 31 further comprising an output device which is a separate system for delivering documents across a network.

43. The system of claim 30 further comprising an output device which is a separate system for delivering documents across a network.

44. The system of claim 29 further comprising an output device which is a separate system for delivering documents across a network.

45. The system of claim 28 further comprising an output device which is a separate system for delivering documents across a network.

46. The system of claim 27 further comprising an output device which is a separate system for delivering documents across a network.



47. The system of claim 26 further comprising an output device which is a separate system for delivering documents across a network.

48. The system of claim 25 further comprising an output device which is a separate system for delivering documents across a network.

49. The system of claim 24 further comprising an output device which is a separate system for delivering documents across a network.

50. The system of claim 23 further comprising an output device which is a separate system for delivering documents across a network.

51. The system of claim 22 further comprising an output device which is a separate system for delivering documents across a network.

52. The system of claim 21 further comprising an output device which is a separate system for delivering documents across a network.

53. The system of claim 20 further comprising an output device which is a separate system for delivering documents across a network.

54. The system of claim 19 further comprising an output device which is a separate system for delivering documents across a network.

55. The system of claim 18 further comprising an output device which is a separate system for delivering documents across a network.

56. The system of claim 17 further comprising an output device which is a separate system for delivering documents across a network.

57. The system of claim 16 further comprising an output device which is a separate system for delivering documents across a network.

58. The system of claim 15 further comprising an output device which is a separate system for delivering documents across a network.

59. The system of claim 14 further comprising an output device which is a separate system for delivering documents across a network.

60. The system of claim 13 further comprising an output device which is a separate system for delivering documents across a network.

61. The system of claim 12 further comprising an output device which is a separate system for delivering documents across a network.

62. The system of claim 11 further comprising an output device which is a separate system for delivering documents across a network.

63. The system of claim 10 further comprising an output device which is a separate system for delivering documents across a network.

64. The system of claim 9 further comprising an output device which is a separate system for delivering documents across a network.

65. The system of claim 8 further comprising an output device which is a separate system for delivering documents across a network.

66. The system of claim 7 further comprising an output device which is a separate system for delivering documents across a network.

67. The system of claim 6 further comprising an output device which is a separate system for delivering documents across a network.

68. The system of claim 5 further comprising an output device which is a separate system for delivering documents across a network.

69. The system of claim 4 further comprising an output device which is a separate system for delivering documents across a network.

70. The system of claim 3 further comprising an output device which is a separate system for delivering documents across a network.

71. The system of claim 2 further comprising an output device which is a separate system for delivering documents across a network.

72. The system of claim 1 further comprising an output device which is a separate system for delivering documents across a network.

73. The system of claim 72 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

74. The system of claim 71 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

26  
75. The system of claim 70 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

76. The system of claim 69 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

77. The system of claim 68 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

78. The system of claim 67 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

79. The system of claim 66 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

1           80.    The system of claim 65 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           81.    The system of claim 64 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           82.    The system of claim 63 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           83.    The system of claim 62 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           84.    The system of claim 61 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           85.    The system of claim 60 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           86.    The system of claim 59 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           87.    The system of claim 58 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           88.    The system of claim 57 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           89.    The system of claim 56 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           90.    The system of claim 55 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           91.    The system of claim 54 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           92.    The system of claim 53 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           93.    The system of claim 52 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           94.    The system of claim 51 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

95. The system of claim 50 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

96. The system of claim 49 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

97. The system of claim 48 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

98. The system of claim 47 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

99. The system of claim 46 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.



100. The system of claim 45 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

101. The system of claim 44 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

102. The system of claim 43 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

103. The system of claim 42 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

104. The system of claim 41 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

105. The system of claim 40 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

106. The system of claim 39 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

107. The system of claim 38 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

108. The system of claim 37 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

109. The system of claim 36 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

110. The system of claim 35 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

111. The system of claim 34 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

112. The system of claim 33 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

113. The system of claim 32 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

114. The system of claim 31 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

115. The system of claim 30 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

116. The system of claim 29 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

117. The system of claim 28 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

118. The system of claim 27 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

119. The system of claim 26 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

120. The system of claim 25 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

121. The system of claim 24 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

122. The system of claim 23 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

123. The system of claim 22 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

124. The system of claim 21 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

125. The system of claim 20 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

126. The system of claim 19 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

127. The system of claim 18 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

128. The system of claim 17 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

129. The system of claim 16 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

130. The system of claim 15 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

131. The system of claim 14 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

132. The system of claim 13 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

133. The system of claim 12 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

134. The system of claim 11 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

135. The system of claim 10 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

136. The system of claim 9 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

137. The system of claim 8 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

138. The system of claim 7 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

139. The system of claim 6 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.



140. The system of claim 5 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

141. The system of claim 4 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

142. The system of claim 3 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

143. The system of claim 2 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

144. The system of claim 1 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

145. A system for delivering documents across a network which comprises:

a document generator configured to output a data stream in a format selected from the group of formats consisting of a device specific format and a device independent format;

a computer configured to receive the data stream from the document generator and programmed to analyze the data stream to determine a best output device by comparing any features required by the data stream with features of any output devices available to the computer; and

the computer further being programmed to translate the data stream into a device specific data stream for the best output device and to transmit the device specific data stream to the best output device.

146. The system of claim 145 wherein the document generator is further configured to embed data into the data stream indicative of a job ticket containing information including rendering characteristics for a generated document and at least one task.

147. The system of claim 146 wherein the computer is further programmed to determine a best output device based upon an affinity value for each output device and whether a particular output device is capable of producing what the data stream requires.

148. The system of claim 145 wherein the computer is further programmed to determine a best output device based upon an affinity value for each output device and whether a particular output device is capable of producing what the data stream requires.

149. The system of claim 148 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to

transmit at least a portion of the data stream to each of the commonly capable output devices.

150. The system of claim 147 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit at least a portion of the data stream to each of the commonly capable output devices.

151. The system of claim 146 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit at least a portion of the data stream to each of the commonly capable output devices.

152. The system of claim 145 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit at least a portion of the data stream to each of the commonly capable output devices.

153. The system of claim 150 wherein the computer is programmed to assign, for every data stream, an affinity value to each output device; compare each available output device based upon each of the output devices abilities and any rendering characteristics required by a particular data stream; and to transmit the data stream to an output device which has a highest affinity value.

154. The system of claim 149 wherein the computer is programmed to assign, for every data stream, an affinity value to each output device; compare each available output device based upon each of the output devices abilities and any rendering characteristics required by a particular data stream; and to transmit the data stream to an output device which has a highest affinity value.

155. The system of claim 148 wherein the computer is programmed to assign, for every data stream, an affinity value to each output device; compare each available output device based upon each of the output devices abilities and any rendering characteristics required by a particular data stream; and to transmit the data stream to an output device which has a highest affinity value.

156. The system of claim 147 wherein the computer is programmed to assign, for every data stream, an affinity value to each output device; compare each available output device based upon each of the output devices abilities and any rendering characteristics required by a particular data stream; and to transmit the data stream to an output device which has a highest affinity value.

157. The system of claim 156 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

158. The system of claim 155 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

159. The system of claim 154 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

160. The system of claim 153 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

161. The system of claim 152 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

162. The system of claim 151 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

163. The system of claim 150 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

164. The system of claim 149 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

165. The system of claim 148 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

166. The system of claim 147 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

167. The system of claim 146 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

168. The system of claim 145 wherein the output device includes a plurality of commonly capable output devices and the computer is programmed to transmit the data stream to each of the commonly capable output devices to distribute production of multiple copies of a document out across the commonly capable output devices.

169. The system of claim 167 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

170. The system of claim 166 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

171. The system of claim 163 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

172. The system of claim 162 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

173. The system of claim 160 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

174. The system of claim 157 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

175. The system of claim 156 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

176. The system of claim 153 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

177. The system of claim 151 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

178. The system of claim 150 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

179. The system of claim 147 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

180. The system of claim 146 wherein embedded data includes multiple tasks and each of the tasks is destined for a different output device.

181. The system of claim 180 further comprising an output device which is a separate system for delivering documents across a network.

182. The system of claim 179 further comprising an output device which is a separate system for delivering documents across a network.

183. The system of claim 178 further comprising an output device which is a separate system for delivering documents across a network.

184. The system of claim 177 further comprising an output device which is a separate system for delivering documents across a network.

185. The system of claim 176 further comprising an output device which is a separate system for delivering documents across a network.

186. The system of claim 175 further comprising an output device which is a separate system for delivering documents across a network.

187. The system of claim 174 further comprising an output device which is a separate system for delivering documents across a network.

188. The system of claim 173 further comprising an output device which is a separate system for delivering documents across a network.

189. The system of claim 172 further comprising an output device which is a separate system for delivering documents across a network.

190. The system of claim 171 further comprising an output device which is a separate system for delivering documents across a network.



191. The system of claim 170 further comprising an output device which is a separate system for delivering documents across a network.

192. The system of claim 169 further comprising an output device which is a separate system for delivering documents across a network.

193. The system of claim 168 further comprising an output device which is a separate system for delivering documents across a network.

194. The system of claim 167 further comprising an output device which is a separate system for delivering documents across a network.

195. The system of claim 166 further comprising an output device which is a separate system for delivering documents across a network.

196. The system of claim 164 further comprising an output device which is a separate system for delivering documents across a network.

197. The system of claim 164 further comprising an output device which is a separate system for delivering documents across a network.

198. The system of claim 163 further comprising an output device which is a separate system for delivering documents across a network.

199. The system of claim 162 further comprising an output device which is a separate system for delivering documents across a network.

200. The system of claim 161 further comprising an output device which is a separate system for delivering documents across a network.

201. The system of claim 160 further comprising an output device which is a separate system for delivering documents across a network.

202. The system of claim 159 further comprising an output device which is a separate system for delivering documents across a network.

203. The system of claim 158 further comprising an output device which is a separate system for delivering documents across a network.

204. The system of claim 157 further comprising an output device which is a separate system for delivering documents across a network.

205. The system of claim 156 further comprising an output device which is a separate system for delivering documents across a network.

206. The system of claim 155 further comprising an output device which is a separate system for delivering documents across a network.

207. The system of claim 154 further comprising an output device which is a separate system for delivering documents across a network.

208. The system of claim 153 further comprising an output device which is a separate system for delivering documents across a network.

209. The system of claim 152 further comprising an output device which is a separate system for delivering documents across a network.

210. The system of claim 151 further comprising an output device which is a separate system for delivering documents across a network.

1                   211. The system of claim 150 further comprising an output device  
2 which is a separate system for delivering documents across a network.

1                   212. The system of claim 149 further comprising an output device  
2 which is a separate system for delivering documents across a network.

1                   213. The system of claim 148 further comprising an output device  
2 which is a separate system for delivering documents across a network.

1                   214. The system of claim 147 further comprising an output device  
2 which is a separate system for delivering documents across a network.

1                   215. The system of claim 146 further comprising an output device  
2 which is a separate system for delivering documents across a network.

1                   216. The system of claim 145 further comprising an output device  
2 which is a separate system for delivering documents across a network.

1                   217. The system of claim 216 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   218. The system of claim 215 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           219. The system of claim 214 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           220. The system of claim 213 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           221. The system of claim 212 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           222. The system of claim 211 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           223. The system of claim 210 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           224. The system of claim 209 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           225. The system of claim 208 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           226. The system of claim 207 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           227. The system of claim 206 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           228. The system of claim 205 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   229. The system of claim 204 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   230. The system of claim 203 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   231. The system of claim 202 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   232. The system of claim 201 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   233. The system of claim 200 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   234. The system of claim 199 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   235. The system of claim 198 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   236. The system of claim 197 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   237. The system of claim 196 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   238. The system of claim 195 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           239. The system of claim 194 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           240. The system of claim 193 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           241. The system of claim 192 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           242. The system of claim 191 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           243. The system of claim 190 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.



1           244. The system of claim 189 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           245. The system of claim 188 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           246. The system of claim 187 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           247. The system of claim 186 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           248. The system of claim 185 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   249. The system of claim 184 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   250. The system of claim 183 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   251. The system of claim 182 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   252. The system of claim 181 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   253. The system of claim 180 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   254. The system of claim 179 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   255. The system of claim 178 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   256. The system of claim 177 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   257. The system of claim 176 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   258. The system of claim 175 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   259. The system of claim 174 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   260. The system of claim 173 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   261. The system of claim 172 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   262. The system of claim 171 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1                   263. The system of claim 170 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

264. The system of claim 169 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

265. The system of claim 168 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

266. The system of claim 167 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

267. The system of claim 166 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

268. The system of claim 165 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

269. The system of claim 164 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

270. The system of claim 163 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

271. The system of claim 162 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

272. The system of claim 161 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

273. The system of claim 160 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

1           274. The system of claim 159 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           275. The system of claim 158 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           276. The system of claim 157 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           277. The system of claim 156 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1           278. The system of claim 155 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

279. The system of claim 154 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

280. The system of claim 153 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

281. The system of claim 152 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

282. The system of claim 151 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.

283. The system of claim 150 wherein the document generator is configured to embed the name of a recipient for a document as opposed to specific device information; and wherein the computer is configured and programmed to deliver the document to a device based upon the recipient's name and any rendering characteristics required by the data stream.



1 284. The system of claim 149 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1 285. The system of claim 148 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1 286. The system of claim 147 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1 287. The system of claim 146 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

1 288. The system of claim 145 wherein the document generator is  
2 configured to embed the name of a recipient for a document as opposed to specific  
3 device information; and wherein the computer is configured and programmed to  
4 deliver the document to a device based upon the recipient's name and any rendering  
5 characteristics required by the data stream.

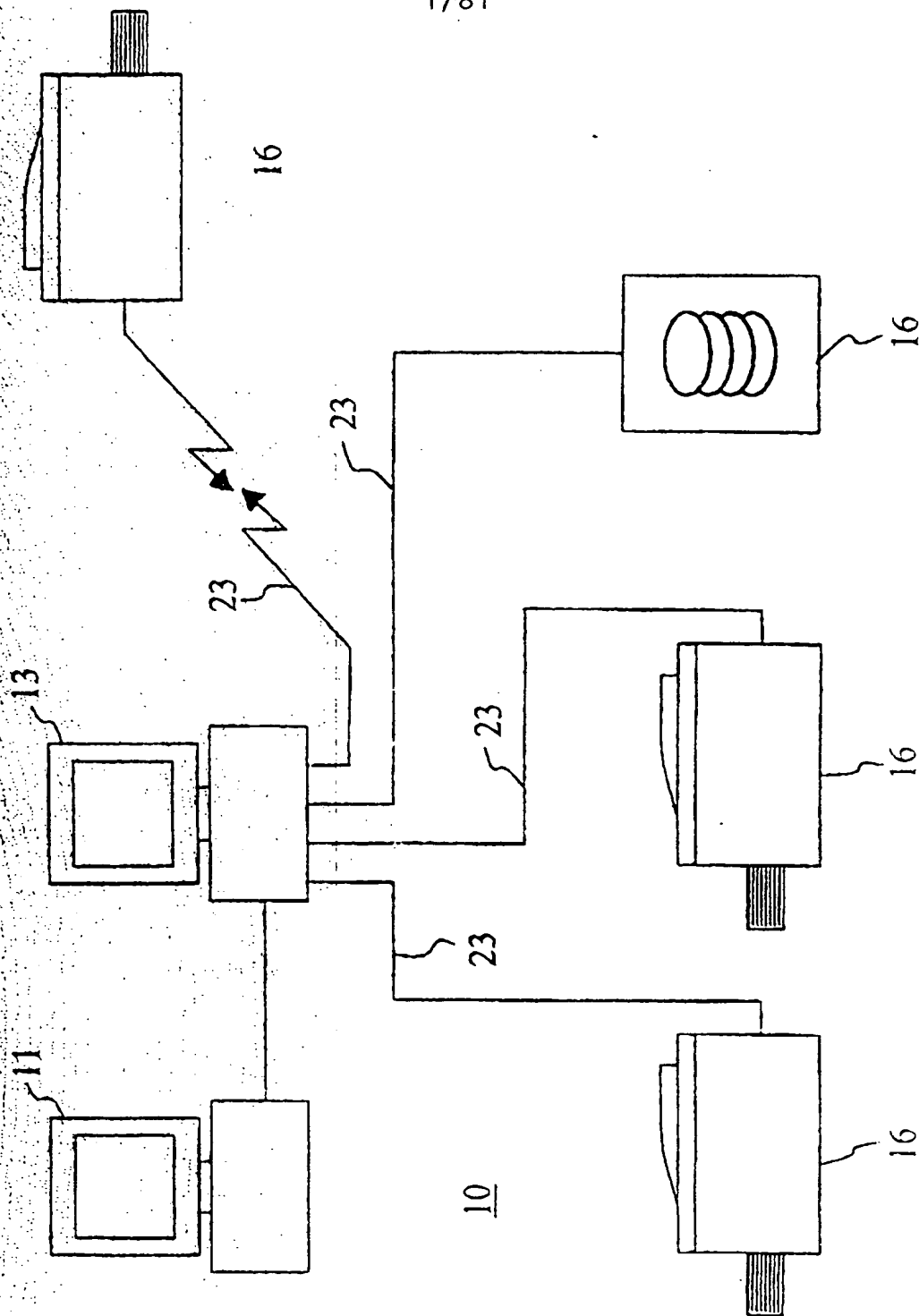


Fig. 1

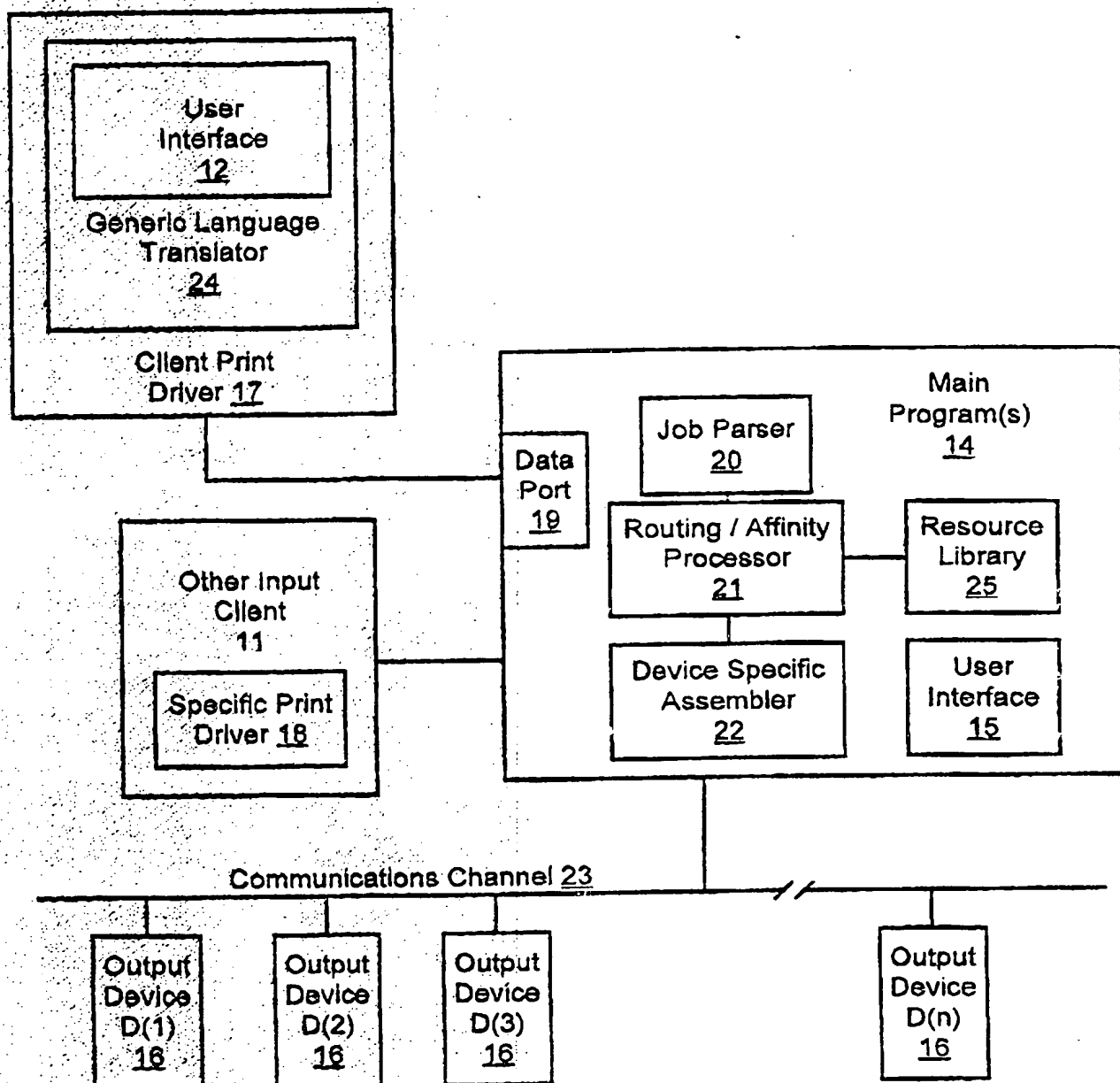


Fig. 2

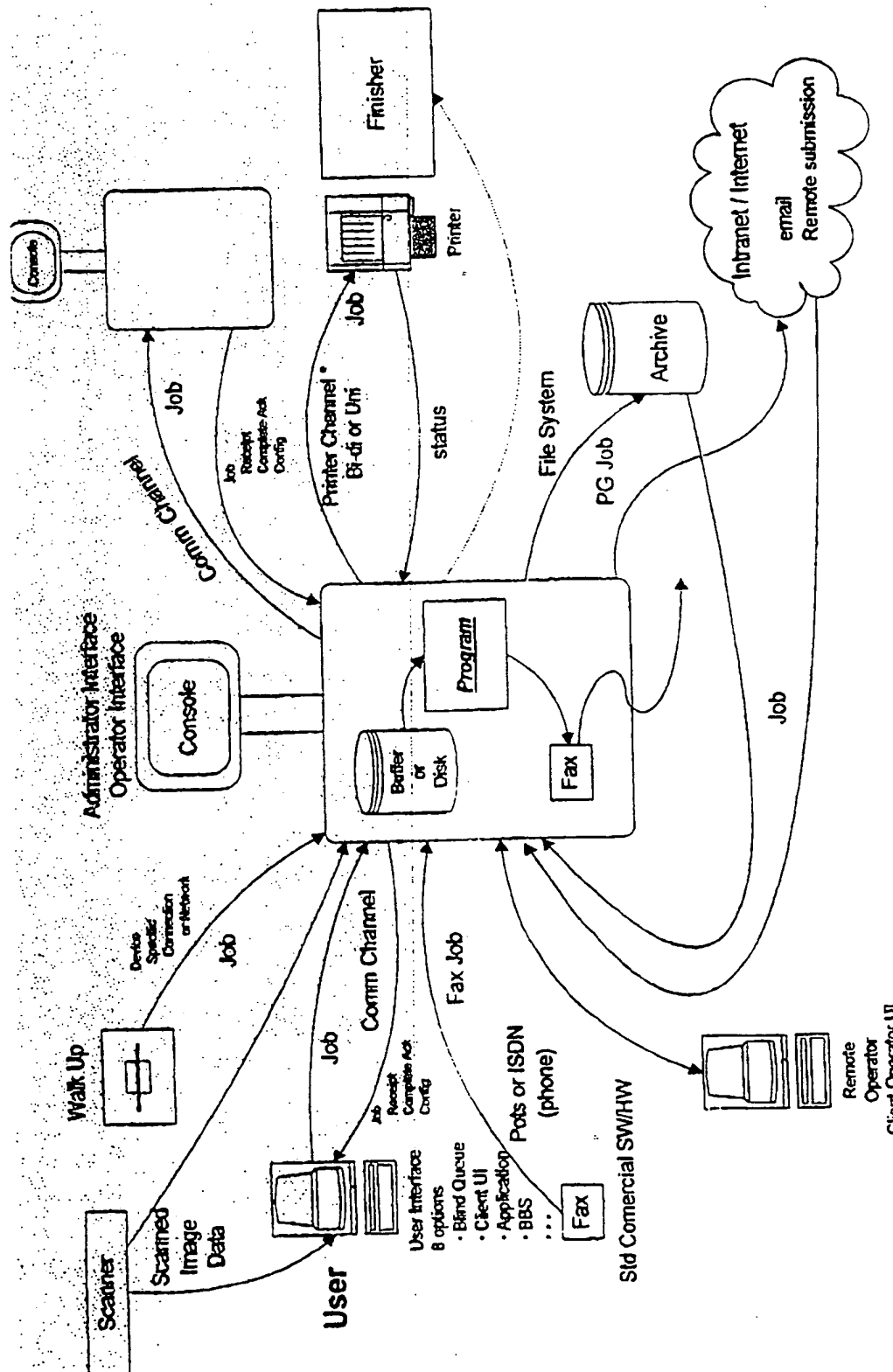


Fig. 3

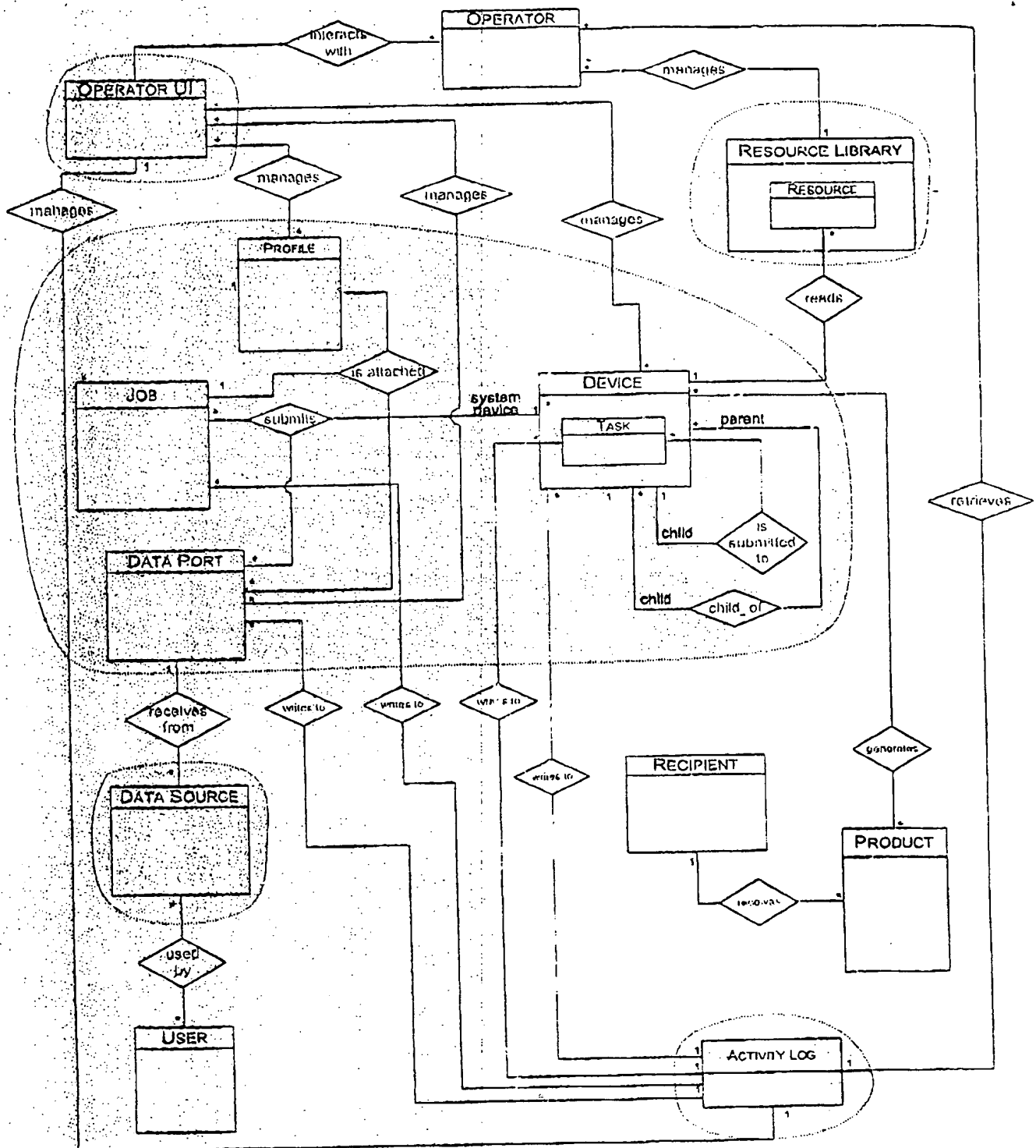


Fig. 4

5/81

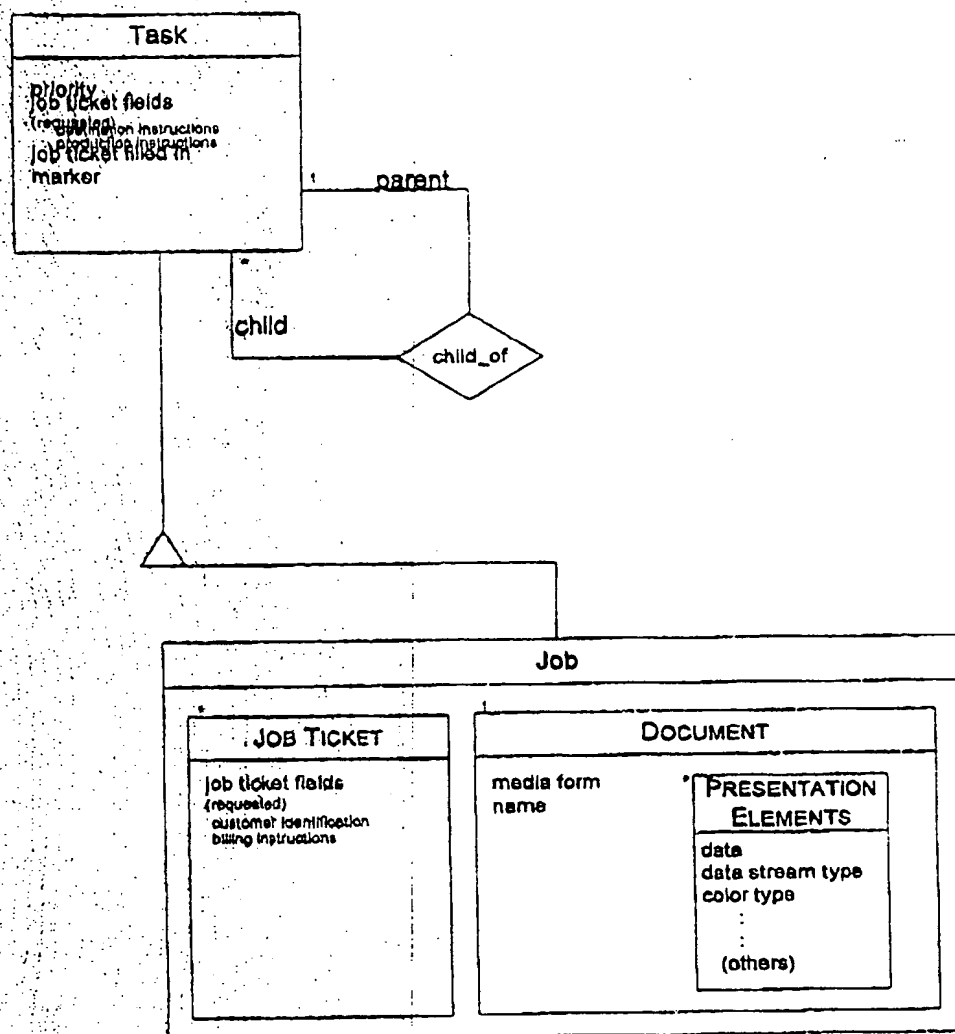


Fig. 5

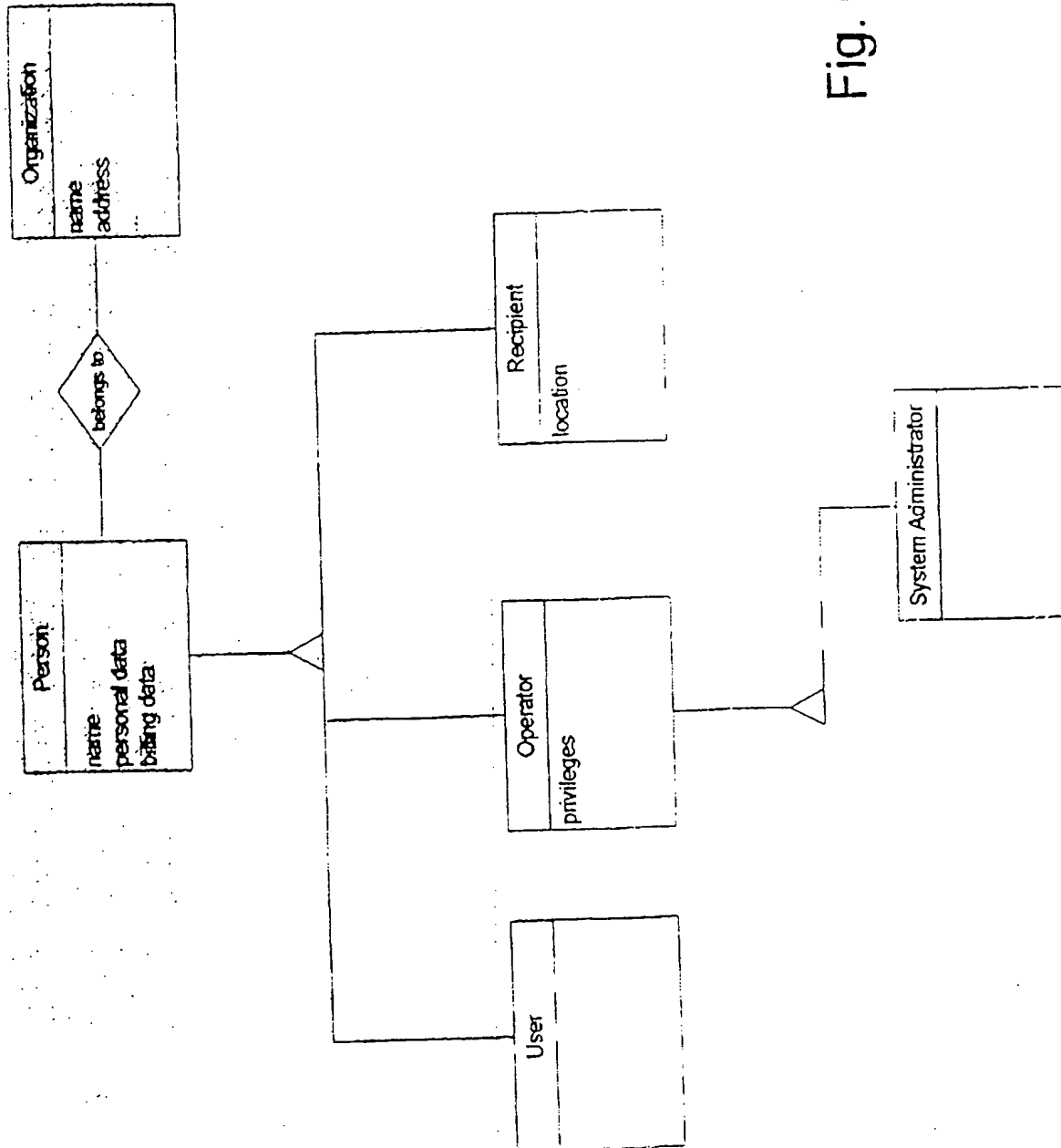


Fig. 6

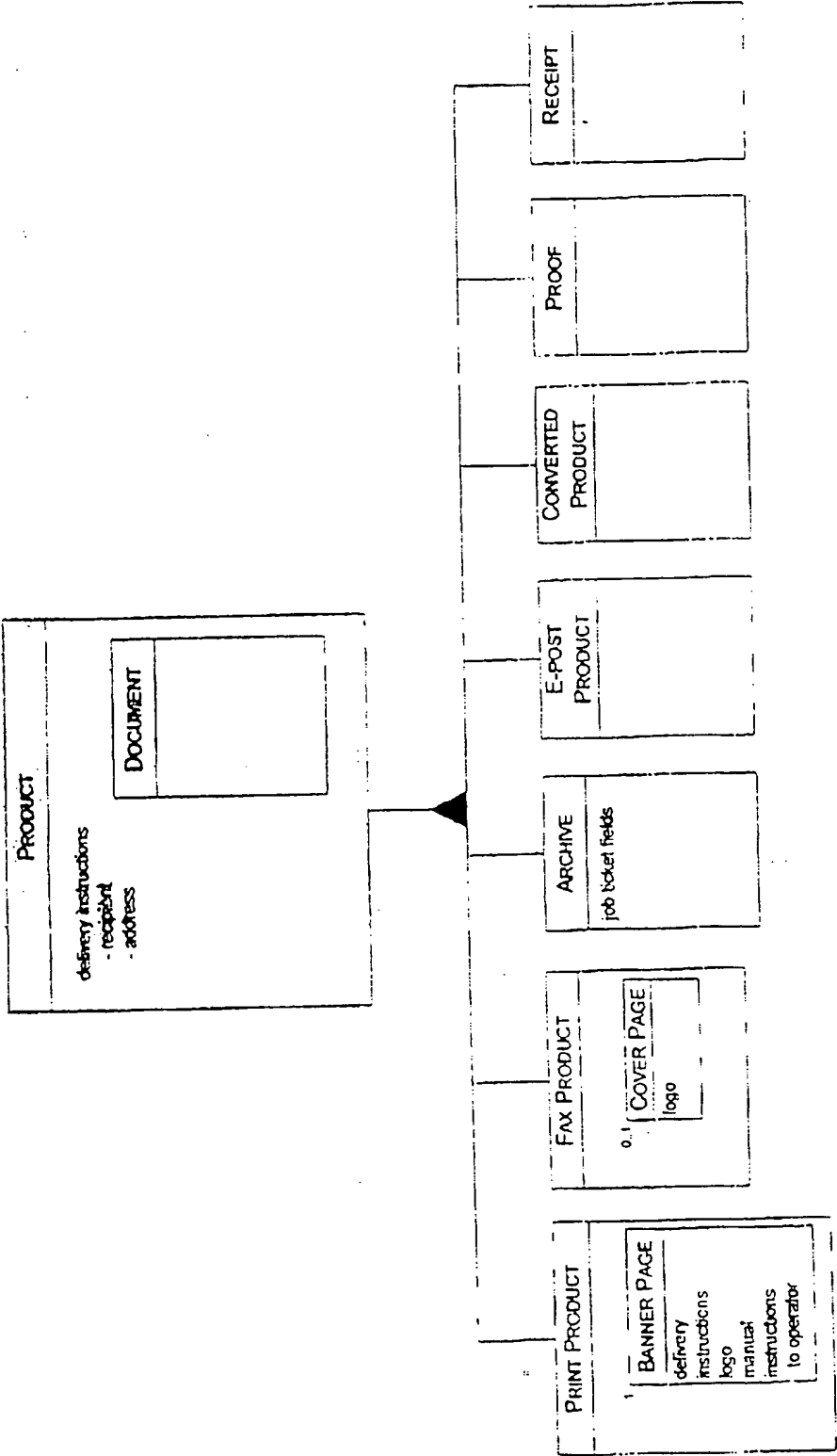


Fig. 7



8/81

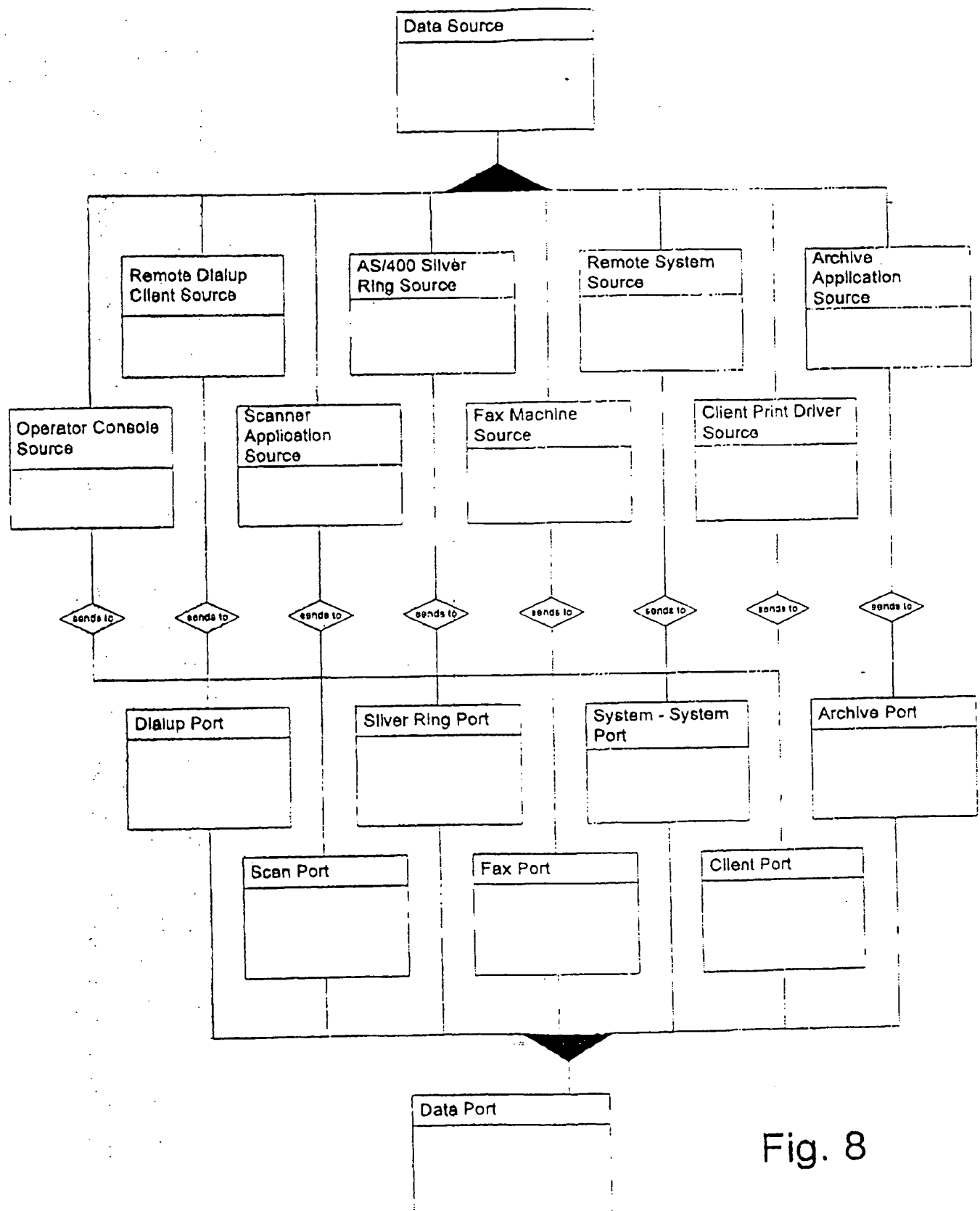


Fig. 8

9/81

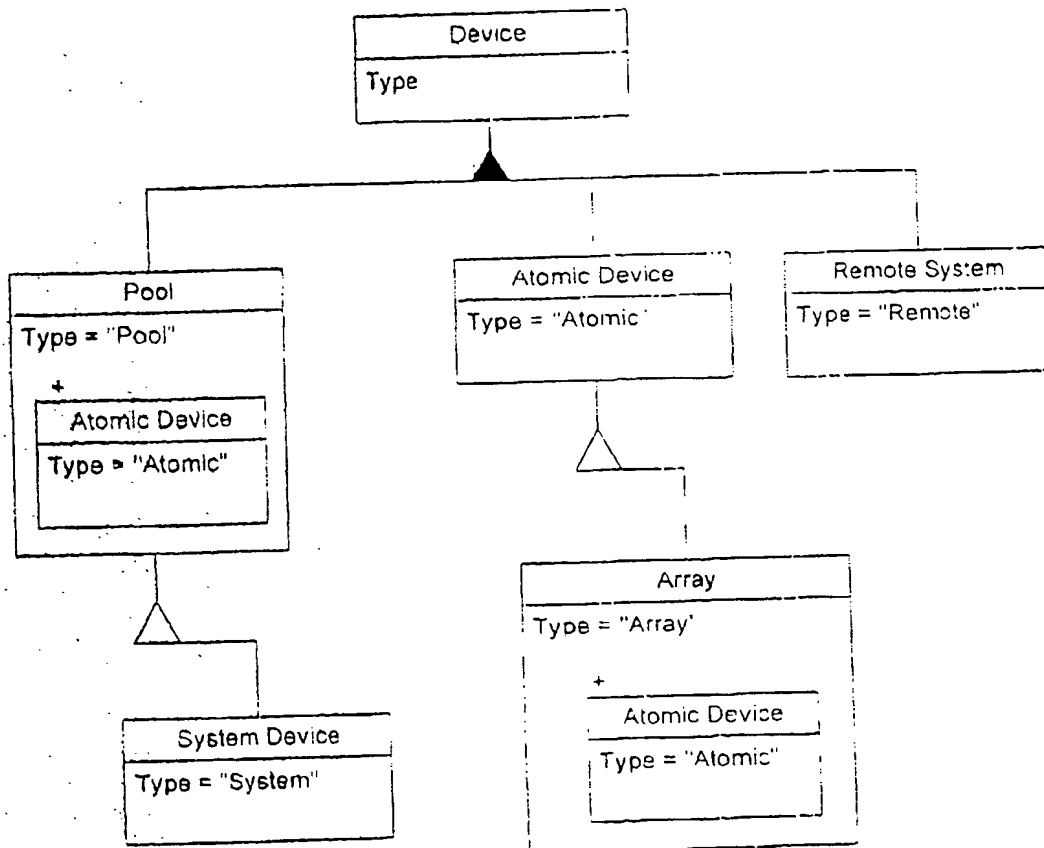


Fig. 9

10/81

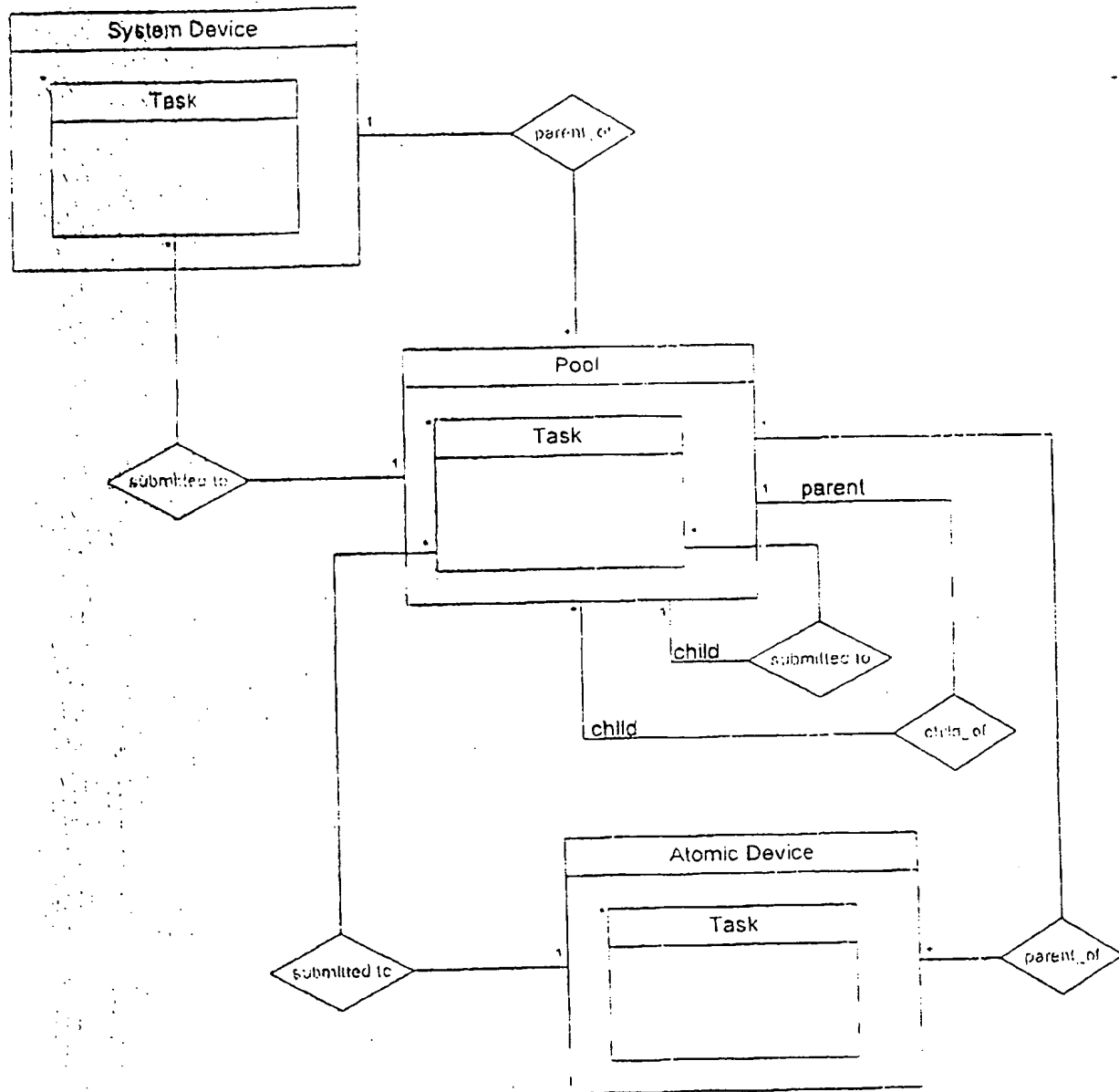


Fig. 10

11/81

```

life-cycle  PrintGate:  (
    ( startup : #device_log_record ) .
    ( Production~ || Operation* || ResourceDelivery~ ) .
    ( shutdown : #device_log_record )
)*

Production  =      submit_job .
    ( #needs_attention . #job_log_record )* .
    ( #needs_resource . #job_log_record )* .
    ( #proof . #job_log_record )* .
    ( #product . #receipt . #job_log_record . #task_log_record* )

Operation   =      Administration | ControlPrintGate

ResourceDelivery  =      ( deliver_resource | deliver_resource_unavailable ) .
    #resource_log_record

Administration   =      DeviceMgmt | PortMgmt
    ControlPrintGate   =      ( enter_job_password .
    #job_log_record ) |
    ( generate_encryption_key_pair . #generate_key_log_record ) |
    JobMgmt |
    TaskMgmt |
    ProfileMgmt |
    WorkQuery

DeviceMgmt =      (
    add_device |
    move_device |
    copy_device |
    change_device |
    remove_device |
    hold_device |
    release_device |
    ( query_device_configuration . #display_device_configuration )
    ) .
    #device_log_record
    ) |
    WorkQuery

```

Fig. 11

12/81

```
PortMgmt = (
    add_port |
    change_port |
    delete_port |
    hold_port |
    release_port |
    ( query_port . #port_properties )
) .
#port_log_record

JobMgmt = (
    change_job_information |
    delete_job |
    ( view_job_document . #document_view ) |
    ( query_job_information . #job_information )
) .
#job_log_record

TaskMgmt = ( add_task |
    change_task |
    cancel_task |
    hold_task |
    release_task |
    ( query_task . #display_task_properties ) ) .
#task_log_record

ProfileMgmt = (
    create_profile |
    change_profile |
    delete_profile |
    ( query_profile . #display_profile_properties )
) .
#profile_log_record

WorkQuery = ( query_device_status . #display_device_status .
    #device_log_record )
```

Fig. 12

13/81

**Operation Schema Listings****Operation Schema: Add Device****Operation:** add\_device**Description:** Adds a new device to the PrintGate system.

---

**Reads:** supplied name: device\_name,  
supplied privilege  
supplied new\_parent : device\_name  
parent\_id: new\_parent.id**Changes:** new new\_device : device,  
new new\_link : is\_child\_of**Sends:** activity\_log:{device\_log\_record}**Assumes:****Result:** If privilege allows, and  
If new\_parent.type is not atomic, and  
If new\_device.type will not be 'system'  
then  
new\_device.name has been initialized to device\_name.  
new\_device.id has been set to default value.  
new\_device.characteristics and new\_device.priority have been  
set to default values,  
new\_link.parent has been set to new\_parent.id.**Fig. 13**

14/81

new\_link.child has been set to new\_device.id.

device\_log\_record has been sent to the activity\_log

Fig. 14

15/81

**Operation Schema: Add Port****Operation:** add\_port**Description:** Operator adds a Data Port to the system.

---

**Reads:** supplied port\_name,  
supplied port\_configuration,  
supplied privileges.**Changes:** new Data\_Port**Sends:** Activity Log:{port\_log\_record}**Assumes:****Result:** If port\_name does not refer to any existing ports, and privileges  
allows this

operation then,

A new Data\_Port has been added to the system.

Data\_Port.name has been set to port\_name.

Data\_Port.configuration has been set to port\_configuration.

Data\_Port.held has been cleared.

port\_log\_record has been sent to the Activity Log

Fig. 15



16/81

**Operation Schema: Add Task****Operation:** add\_task**Description:** Adds a new task for a job on to the system device.

---

**Reads:**  
supplied task\_instructions,  
supplied job\_id,  
supplied privileges,  
job with job.id = job\_id.**Changes:** new task,  
device with device.type = "system"**Sends:** activity\_log: {task\_log\_record}**Assumes:****Result:**  
If privileges allow this operation and  
job\_id identifies a job with job.id = job\_id then  
A new Task has been added to the system Device,  
Task.job\_id has been set to job\_id,  
Task.instructions have been set to task\_instructions.  
  
task\_log\_record has been sent to the activity\_log.**Fig. 16**

17/81

**Operation Schema: Cancel Task****Operation:**      `cancel_task`**Description:** Removes a job's task from the system

---

**Reads:**              `supplied task_id`  
                         `supplied privileges`**Changes:**      `delete Task with task.id = task_id`  
                         `device with device_id = task.device_id`**Sends:**              `activity log: {task_log_record}`**Assumes:****Result:**              `If privileges allows this operation then`  
                         `task has been removed from device.``task_log_record has been sent to the activity log.`**Fig. 17**

18/81

**Operation Schema: Change Device****Operation:** change\_device**Description:** Changes a device's name, characteristics and priority.

---

**Reads:**

- supplied old\_name : device\_name
- supplied new\_name: device\_name,
- supplied new\_characteristics : characteristics,
- supplied new\_priority : priority,
- supplied privilege
- supplied dev\_id : device\_id

**Changes:** changed\_device : device with device.name=old\_name and  
device\_id=dev\_id

**Sends:** activity\_log:{device\_log\_record}

**Assumes:**

**Result:**

- If privilege allows and
- If changed\_device.hold is set, then
- changed\_device.name has been set to new\_name.
- changed\_device.characteristics has been set to  
new\_characteristics.
- changed\_device.priority has been set to new\_priority.

device\_log\_record has been sent to the activity\_log

**Fig. 18**

19/81

**Operation Schema: Change Job Information****Operation:** change\_job\_information**Description:** Operator changes customer and billing information for a given job.

---

**Reads:** supplied job\_identification,  
supplied new\_billing\_information,  
supplied new\_customer\_information  
supplied privileges.**Changes:** Job with Job\_Id = job\_identification**Sends:** Activity Log: {job\_record(s)}**Assumes:** The new billing and customer information is valid.**Result:** If privileges allows operation then,  
Job.billing\_information has been set to new\_billing\_information.  
Job.customer\_information has been set to  
new\_customer\_information.

job\_record(s) has been sent to the Activity Log.

Fig. 19

20/81

**Operation Schema: Change Port****Operation:** change\_port**Description:** Operator changes the configuration of a Data Port

---

**Reads:**  
supplied old\_port\_name,  
supplied new\_port\_name,  
supplied new\_configuration,  
supplied privileges.**Changes:** Initial Data\_Port with Data\_Port.name = old\_port\_name.**Sends:** Activity Log:{port\_log\_record}**Assumes:****Result:** If new\_port\_name does not refer to any existing ports,  
privileges allows operation, and  
Data\_Port.held is set then,  
Final Data\_Port.name has been set to new\_port\_name.  
Final Data\_Port.configuration has been set to  
new\_configuration.

port\_log\_record has been sent to the Activity Log

Fig. 20

**Operation Schema: Change Profile****Operation:** change\_profile**Description:** Changes the attributes of an existing customer/user profile.

---

**Reads:**

- supplied old\_name,
- supplied new\_name,
- supplied capabilities,
- supplied new\_default\_job\_ticket,
- supplied privileges.

**Changes:** profile with profile.name = old\_name**Sends:** activity\_log: {profile\_log\_record}**Assumes:****Result:** If new\_name does not refer to any existing profile.name and  
privileges allows

this operation then

Profile.name is set to new\_name,

Profile.capabilities is set to new\_capabilities,

Profile.default\_job\_ticket is set to new\_default\_job\_ticket.

profile\_log\_record has been sent to the activity\_log.

**Fig. 21**

22/81

## Operation Schema: Change Task

**Operation:** change\_task**Description:** Changes a task's attributes or device assignment

---

**Reads:** supplied task\_id,  
supplied new\_instructions,  
supplied privileges.**Changes:** Task with Task.id = task\_id,  
original\_device: *Initial* device with device.id = task.device\_id,  
system\_device: device with device.type = "system".**Sends:** activity\_log: {task\_log\_record}**Assumes:****Result:** If privileges allows this operation then  
Task.instructions has been set to new\_instructions.  
Task.hold\_status has been set on. \*If *Final* Task.instructions can not be performed on  
original\_device then

Task has been removed from original\_device.

Fig. 22

23/81

Task has been assigned to system\_device.

task\_log\_record has been sent to the activity\_log.

\* Note: this means that task will need to be released later.

Fig. 23



**Operation Schema: Copy Device****Operation:** copy\_device**Description:** Copies a device to a different pool.

---

**Reads:**

- supplied new\_parent : device\_id
- supplied child\_id : device\_id
- supplied privilege
- parent : device with device.id = new\_parent
- child : device with device.id = child\_id

**Changes:** new new\_link : is\_child\_of

**Sends:** activity\_log:{device\_log\_record}

**Assumes:**

**Result:**

- If privilege allows, and
- If child has not become an ancestor of child, and
- If parent.type is not atomic, and
- If child.type is not system,

then

- new\_link.parent has been set to new\_parent and
- new\_link.child has been set to child\_id.

**Fig. 24**

25/81

device\_log\_record has been sent to the activity\_log

Fig. 25

26/81

**Operation Schema: Create Profile****Operation:** create\_profile**Description:** Adds a new customer/user profile to the system.

---

**Reads:** supplied name,  
supplied privileges.**Changes:** new profile**Sends:** activity\_log: {profile\_log\_record}**Assumes:****Result:** If name does not refer to any existing profile.name and  
privileges allows this

operation then

A new profile has been added to the system.

Profile.name has been set to name,

Profile.capabilities has been set to profile.capabilities from

profile with

profile with profile.name = "Default".

profile\_log\_record has been sent to the activity\_log.

Fig. 26

27/81

**Operation Schema: Delete Job****Operation:** delete\_job**Description:** Operator deletes a Job and all of its associated Tasks from the system.

---

**Reads:** supplied job\_identification,  
supplied privileges.**Changes:** delete Job with Job.id = job\_identification,  
delete all Tasks with Task.job\_id = job\_identification,  
for each Task above,  
Device with Device.id = Task.device\_id.**Sends:** Activity Log: {job\_log\_record}**Assumes:****Result:** If privileges allows operation then,  
Job has been removed from system.  
All Tasks associated with Job have been removed from their  
respective  
devices.

job\_log\_record has been sent to Activity Log.

Fig. 27

28/81

**Operation Schema: Delete Port****Operation:** delete\_port**Description:** Operator removes a Data Port from the system.

---

**Reads:** supplied port\_name,  
supplied privileges.**Changes:** delete Data\_Port with Data\_Port.name = port\_name.**Sends:** Activity Log:{port\_log\_record}**Assumes:****Result:** If privileges allows the operation, and Data\_Port.held is set  
then,The Data\_Port with Data\_Port.name = port\_name has been removed  
from  
the system.

port\_log\_record has been sent to the Activity Log.

Fig. 28

29/81

**Operation Schema: Delete Profile****Operation:** delete\_profile**Description:** Remove an existing customer/user profile from the system.

---

**Reads:** supplied name,  
supplied privileges.**Changes:** delete profile with profile.name = name.**Sends:** activity\_log: {profile\_log\_record}**Assumes:****Result:** If privileges allows this operation then  
named profile is removed from the system.

profile\_log\_record has been sent to the activity\_log.

Fig. 29

30/81

**Operation Schema: Deliver Resource****Operation:** deliver\_resource**Description:** Resource Library delivers a Resource to a Device that is processing a Task.

---

**Reads:** supplied device\_name,  
supplied resource\_name,  
supplied resource\_type,  
supplied resource\_data.**Changes:** Device with Device.name = device\_name.**Sends:** Activity Log:{job\_log\_record}**Assumes:****Result:** If Device.processes.resource\_name is resource\_name,  
Device.processes.resource\_type is resource\_type, and  
Device.processes.resource\_data is NULL then,  
Device.processes.resource\_data has been set to  
resource\_data.

job\_log\_record has been sent to the Activity Log.

Fig. 30

31/81

**Operation Schema: Deliver Resource Unavailable****Operation:** deliver\_resource\_unavailable

**Description:** Resource Library Indicates that a Resource needed by a Device that is processing a Task cannot be delivered.

---

**Reads:** supplied device\_name,  
supplied resource\_name,  
supplied resource\_type,  
Device with Device.name = device\_name.

**Changes:** Task with Taks.Id = Device.task\_id.

**Sends:** Activity Log:{job\_log\_record}  
Operator:{attention\_required}

**Assumes:**

**Result:** If Device.processes.resource\_name is set to resource\_name,  
Device.processes.resource\_type is set to resource\_type, and  
Device.processes.resource\_data is set to NULL then,  
Task.held has been set.  
Task.intervention\_required has been set.  
attention\_required has been sent to the Operator.

Job\_log\_record has been sent to the Activity Log

Fig. 31



**Operation Schema: Enter Job Password**

**Operation:** enter\_job\_password

**Description:** Operator enters password to allow Job to be processed.

---

**Reads:** supplied job\_identification,  
supplied password,  
supplied privileges.

**Changes:** Job with Job.id = job\_identification

**Sends:** Activity Log: {job\_log\_record}

**Assumes:**

**Result:** If operator\_privileges allows operation, and  
Job.password\_required is set, and  
Job.password is set to password then,  
Job.password\_required is cleared.

job\_log\_record has been sent to Activity Log.

**Fig. 32**

33/81

**Operation Schema: Generate Encryption Key Pair****Operation:** generate\_encryption\_key\_pair**Description:** Operator generates a encryption/decryption key pair for job encryption.

---

**Reads:** supplied privileges,  
supplied profile\_name.**Changes:** Profile with Profile.name = profile\_name**Sends:** Operator: {public\_decryption\_key},  
Activity Log: {profile\_log\_record}.**Assumes:****Result:** If privileges allows the operation then,  
A encryption/decryption key pair has been generated.  
Profile.encryption\_key has been set to the encryption key.  
Profile.decryption\_key has been set to the decryption key.  
The decryption key has been sent to the Operator.

profile\_log\_record has been sent to the Activity Log

Fig. 33

**Operation Schema: Hold Device****Operation:** hold\_device**Description:** Pauses a device's execution

---

**Reads:** supplied dev\_id: device\_id  
supplied privilege**Changes:** held\_device : device with device.id equal to dev\_id**Sends:** activity\_log:{device\_log\_record}**Assumes:****Result:** If privilege allows, and device.hold\_status for held\_device is  
cleared, then

The device.hold\_status for held\_device has been set.

device\_log\_record has been sent to the activity\_log

Fig. 34

35/81

**Operation Schema: Hold Port****Operation:** hold\_port**Description:** Operator holds a Data Port to prevent Job submission.

---

**Reads:** supplied port\_name ,  
supplied privileges.**Changes:** Data\_Port with Data\_Port.name = port\_name.**Sends:** Activity Log:{port\_log\_record}**Assumes:****Result:** If Data\_Port.held is not set, and privileges allows operation  
then,

Data\_Port.held has been set.

port\_log\_record has been sent to the Activity Log.

**Fig. 35**

36/81

**Operation Schema: Hold Task****Operation:** hold\_task**Description:** Places a task on hold so that it will not continue to be processed.

---

**Reads:** supplied task\_id,  
supplied privileges.**Changes:** task with task.id = task\_id**Sends:** activity\_log: {task\_log\_record}**Assumes:****Result:** If privileges allows this operation and  
If *Initial* task.hold\_status is cleared then  
*Final* task.hold\_status has been set.  
  
task\_log\_record has been sent to the activity\_log.

Fig. 36

37/81

**Operation Schema: Move Device****Operation:** move\_device**Description:** Moves a device to a different pool.

---

**Reads:**

- supplied old\_parent : device\_id
- supplied new\_parent : device\_id
- supplied child\_id : device\_id
- supplied privilege
- parent : device with device.id = new\_parent
- child : device with device.id = child\_id

**Changes:**

- new new\_link : is\_child\_of
- delete old\_link : is\_child\_of with is\_child\_of.parent = old\_parent and is\_child\_of.child = child\_id

**Sends:** activity\_log:{device\_log\_record}

**Assumes:**

**Result:**

- If privilege allows, and
- If child has not become an ancestor of child, and
- If new\_parent.type is not atomic, and
- If child.type is not system, and
- If child.hold is set,

then

old\_link has been removed and

Fig. 37

38/81

new\_link.parent has been set to new\_parent and  
new\_link.child has been set to child\_id.

device\_log\_record has been sent to the activity\_log

Fig. 38

39/81

**Operation Schema: Query Device Configuration****Operation:** query\_device\_configuration**Description:** Reports the current configuration and properties of a device

---

**Reads:** supplied device\_name,  
supplied privileges,  
device with device.name = device\_name.**Changes:****Sends:** operator: {device\_properties}  
activity\_log: {device\_log\_record}**Assumes:****Result:** If privileges allow this operation then  
device\_properties sent to operator.

device\_log\_record has been sent to the activity\_log.

Fig. 39



40/81

**Operation Schema: Query Device Status****Operation:**     query\_device\_status**Description:** Reports the current processing status of a system device

---

**Reads:**             supplied device\_name,  
                      supplied privileges,  
                      device with device.name = device\_name.**Changes:****Sends:**             operator: {device\_status}  
                      activity\_log: {device\_log\_record}**Assumes:****Result:**            If privileges allow this operation then  
                      device\_status sent to operator.

device\_log\_record has been sent to the activity\_log.

**Fig. 40**

41/81

## Operation Schema: Query Job Information

**Operation:** query\_job\_information

**Description:** Reports the current job-level properties of a job

---

**Reads:** supplied job\_id,  
supplied privileges,  
job with job\_id = job\_id.

**Changes:**

**Sends:** operator: {job\_information}  
activity\_log: {job\_log\_record}

**Assumes:**

**Result:** If privileges allow this operation then  
job\_information sent to operator.

job\_log\_record has been sent to the activity\_log.

Fig. 41

42/81

## Operation Schema: Query Port

**Operation:** query\_port

**Description:** Reports the current properties and status of a data port

---

**Reads:** supplied port\_name,  
supplied privileges,  
port with port.name = port\_name.

**Changes:**

**Sends:** operator: {port\_properties, port\_status}  
activity\_log: {port\_log\_record}

**Assumes:**

**Result:** If privileges allow this operation then  
port\_properties and port\_status sent to operator.

port\_log\_record has been sent to the activity\_log.

Fig. 42

43/81

## Operation Schema: Query Profile

**Operation:** query\_profile**Description:** Reports the current properties of a profile

---

**Reads:** supplied profile\_name,  
supplied privileges,  
profile with profile.name = profile\_name.**Changes:****Sends:** operator: {profile\_properties}  
activity\_log: {profile\_log\_record}**Assumes:****Result:** If privileges allow this operation then  
profile\_properties sent to operator.  
  
profile\_log\_record has been sent to the activity\_log.

Fig. 43

44/81

**Operation Schema: Query Task****Operation:** query\_task**Description:** Reports the current properties and status of a task

---

**Reads:**  
supplied task\_id,  
supplied privileges,  
Task with Task.Id = task\_id.**Changes:****Sends:** Operator: {task\_properties, task\_status}  
activity\_log: {task\_log\_record}**Assumes:****Result:**If privileges allow this operation then  
task\_properties and task\_status sent to Operator.

task\_log\_record has been sent to activity\_log.

**Fig. 44**

45/81

**Operation Schema: Release Device****Operation:** release\_device**Description:** Resumes a device's execution after it has been paused.

---

**Reads:** supplied dev\_id: device\_id,  
supplied privilege**Changes:** released\_device : device with device.id equal to device\_id**Sends:** activity\_log:{device\_log\_record}**Assumes:****Result:** If privilege allows, and device.hold for released\_device is set,  
then

The device.hold for released\_device has been cleared.

device\_log\_record has been sent to the activity\_log

Fig. 45

46/81

**Operation Schema: Release Port****Operation:** release\_port**Description:** Operator releases a Data Port to allow Job submission;  

---

**Reads:** supplied port\_name,  
supplied privileges.**Changes:** Data\_Port with Data\_Port.name = port\_name.**Sends:** Activity Log:{port\_log\_record}**Assumes:****Result:** If privileges allows operation then,  
Data\_Port.status has been set to Ready.

port\_log\_record has been sent to the Activity Log

**Fig. 46**

47/81

**Operation Schema: Release Task****Operation:** release\_task**Description:** Resumes a task's operation so that it will continue to be processed.**Reads:** supplied task\_id,  
supplied privileges.**Changes:** task with task.id = task\_id**Sends:** activity\_log: {task\_log\_record}**Assumes:****Result:** If privileges allows this operation and  
If *Initial* task.hold\_status is set on then  
*Final* task.hold\_status has been cleared.  
task\_log\_record has been sent to the activity\_log.**Fig. 47**



**Operation Schema: Remove Device**

**Operation:** remove\_device

**Description:** Removes a device from a pool. If it is the only instance of that device in the system, the device is removed from the PrintGate system.

---

**Reads:** supplied dev\_id: device\_id,  
supplied privilege  
supplied parent\_id : device\_id

**Changes:** delete link: is\_child\_of with is\_child\_of.child = dev\_id and  
is\_child\_or\_parent = parent\_id  
delete last\_device : device with device.id = dev\_id

**Sends:** activity\_log:{device\_log\_record}

**Assumes:**

**Result:** If privilege allows and  
If last\_device.hold is set, then  
link has been removed and  
If no other is\_child\_of with is\_child\_of.child = dev\_id then  
last\_device has been removed.  
Otherwise, last\_device has not been removed.  
device\_log\_record has been sent to the activity\_log

**Fig. 48**

49/81

**Operation Schema: Shutdown****Operation:** shutdown**Description:** Shuts down the PrintGate system.

---

**Reads:** supplied privilege**Changes:** system\_device : device with device.type equal to 'system'  
all\_devices : all devices in the system which have device.hold cleared**Sends:****Assumes:****Result:** If privilege allows, and  
If device.availability for system\_device has been set then  
system\_device has had device.availability cleared  
all\_devices has had device.hold set  
device\_log\_record has been sent to the activity\_log.**Fig. 49**

50/81

**Operation Schema: Startup****Operation:** startup**Description:** Starts the PrintGate system.**Reads:** supplied privilege**Changes:** system\_device : device with device.type equal to 'system'  
all\_devices : all devices in the system which have device.hold set**Sends:** activity\_log: {device\_log\_record}**Assumes:****Result:** If privilege allows, and  
If device.availability for system\_device has not been set then  
system\_device has had device.availability set.  
all\_devices has had device.hold cleared  
Otherwise, no change occurs.  
  
device\_log\_record has been sent to the activity\_log.**Fig. 50**

**Operation Schema: Submit Job****Operation:** submit\_job**Description:** Data Source adds a Job to the system.

---

**Reads:**

- supplied port\_name,
- supplied originator,
- supplied job\_ticket,
- supplied document\_data,
- Data\_Port with Data\_Port.name = port\_name,
- Profile with Profile.name = originator,
- Profile with Profile.name = port\_name,
- Profile with Profile.name = "Default".

**Changes:** new Job.**Sends:**

- Product: {proof, product, receipt},
- Operator: {processing\_job, completed\_job, needs\_attention},
- Resource Library: {resource\_request},
- Activity Log: {job\_log\_record(s)}.

**Assumes:** document\_data is in a supported PDL.**Result:**

- If Data\_Port.held is cleared then,
- A new job has been added to the system.
- Job.instructions, Job.customer\_information and
- Job.billing\_information

**Fig. 51**

52/81

have been set based on the job\_ticket.

Job.document\_data has been set to document\_data.

Job.originator has been set to originator.

If Profile with Profile.name = Job.originator exists then,

If Job.is\_encrypted is set,

Job.instructions, Job.customer\_information,

Job.billing\_information and Job.document\_data has

been decrypted using Profile.decryption\_key from Profile

with Profile.name

Job.originator.

Job.instructions, Job.customer\_information and

Job.billing\_information has been merged with

Profile.default\_instructions,

Profile.default\_customer\_information and

Profile.default\_billing\_information respectively from Profile with

Profile.name = Job.originator.

Job.priority has been set to Profile.default\_priority from Profile

with

Profile.name = Job.originator.

Otherwise If Profile with Profile.name = Job.port exists then,

If Job.is\_encrypted is set,

Job.instructions, Job.customer\_information,

Job.billing\_information and Job.document\_data has been decrypted using

Profile.decryption\_key from Profile with Profile.name = Job.port.

Job.instructions, Job.customer\_information and

Job.billing\_information has been merged with

Profile.default\_instructions.

Operation Schema: Submit Job (Continued)

Fig. 52

53/81

Profile.default\_customer\_information and  
Profile.default\_billing\_information respectively from Profile with Profile.name  
Job.port.  
Job.priority has been set to Profile.default\_priority from Profile  
With  
Profile.name = Job.port.  
Otherwise,  
If Job.is\_encrypted is set,  
Job.instructions, Job.customer\_information,  
Job.billing\_information and Job.document\_data has been decrypted using  
Profile.decryption\_key from Profile with Profile.name = "Default".  
Job.instructions, Job.customer\_information and  
Job.billing\_information has been merged with  
Profile.default\_instructions,  
Profile.default\_customer\_information and  
Profile.default\_billing\_information respectively from Profile  
with Profile.name = "Default".  
Job.priority has been set to Profile.default\_priority from Profile  
with  
Profile.name = "Default".  
job\_log\_record(s) has been sent to the Activity Log.  
processing\_job indicator (i.e. lights) has been signaled to the Operator.  
If operator attention was required then,  
needs\_intervention indicator (i.e. lights) has been signaled to  
the Operator.  
If external resources were required then,  
resource\_request has been sent to the Resource Library.  
Job.status has been set to Done.

Fig. 53

54/81

completed Job Indicator (i.e. lights) has been signaled to the Operator.  
If Job Instructions indicate that a proof was required then,

A proof has been generated.

The product has been generated.

A receipt has been generated.

Otherwise,

There was no effect on the system.

Fig. 54

55/81

**Operation Schema: View Job Document****Operation:** view\_job\_document**Description:** Operator views a representation of the document data of a Job.

---

**Reads:**  
supplied job\_identification,  
supplied privileges,  
Job with Job.Id = job\_identification.**Changes:****Sends:**  
Operator: {document\_representation},  
Activity Log: {job\_log\_record}.**Assumes:****Result:**  
If the privileges allows the operation then,  
Job.document\_data has been converted into a viewable format.  
The viewable data has been presented to the Operator.

job\_log\_record has been sent to the Activity Log

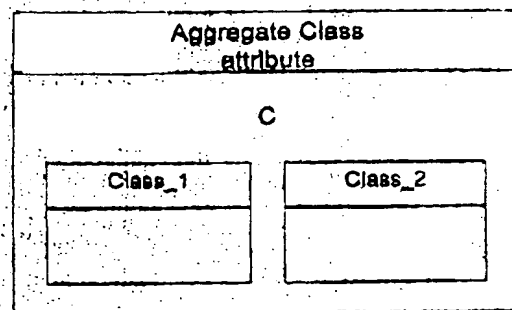
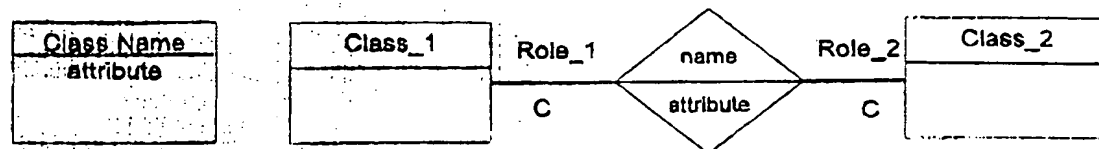
**Fig. 55**



56/81

# Fusion Notation Summary

## Object Model Notation



### CARDINALITY (C)

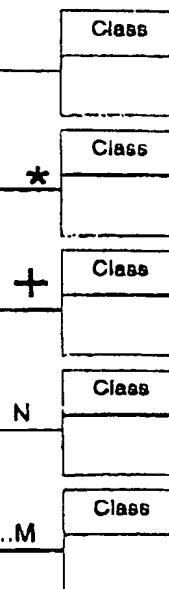
Zero or More (default)

Zero or More

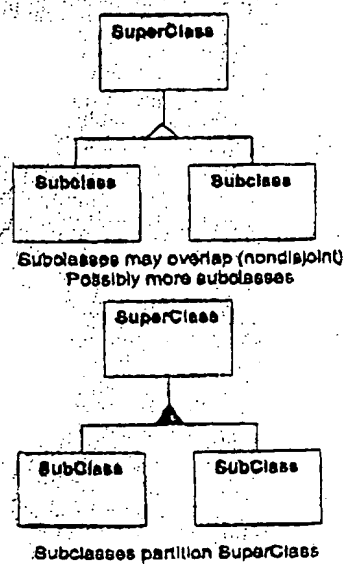
One or More

Numeric Value

Numeric Range



### GENERALIZATION (SUBTYPING INHERITANCE)



### TOTAL MARKER

All members participate

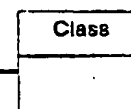


Fig. 56

### Life-Cycle Model Notation

life cycle [Name :] Regular\_Expression  
(LocalName = Regular\_Expression)\*

Regular_Expressions: event	Name	Any event name (operation) , Local name, or output
	Concatenation	x.y
	Alternation	x y
	Repetition	
	Zero or more	x <sup>+</sup>
	One or more	x <sup>+</sup>
	Optional	[x]
	Interleaving	
	Grouping	(x)

### Operation Model Notation

Operation:	operation identifier
Description:	<text> Description of operation
Reads:	<supplied values> <state components>
Changes:	<supplied values> <state components>
Sends:	<agent communication> <state components>
Assumes:	<assertions> (preconditions)
Result:	<assertions> (preconditions)

Fig. 57

58/81

## Object Interaction Graph Notation

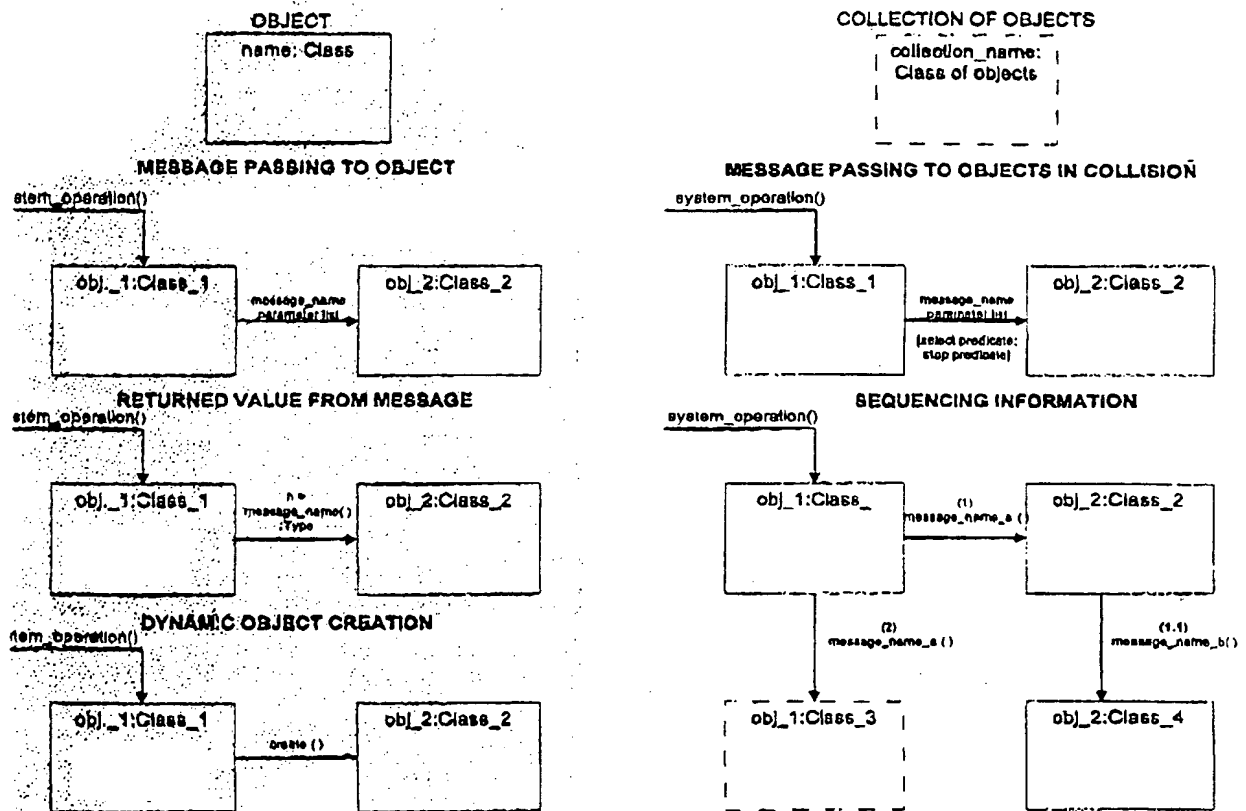
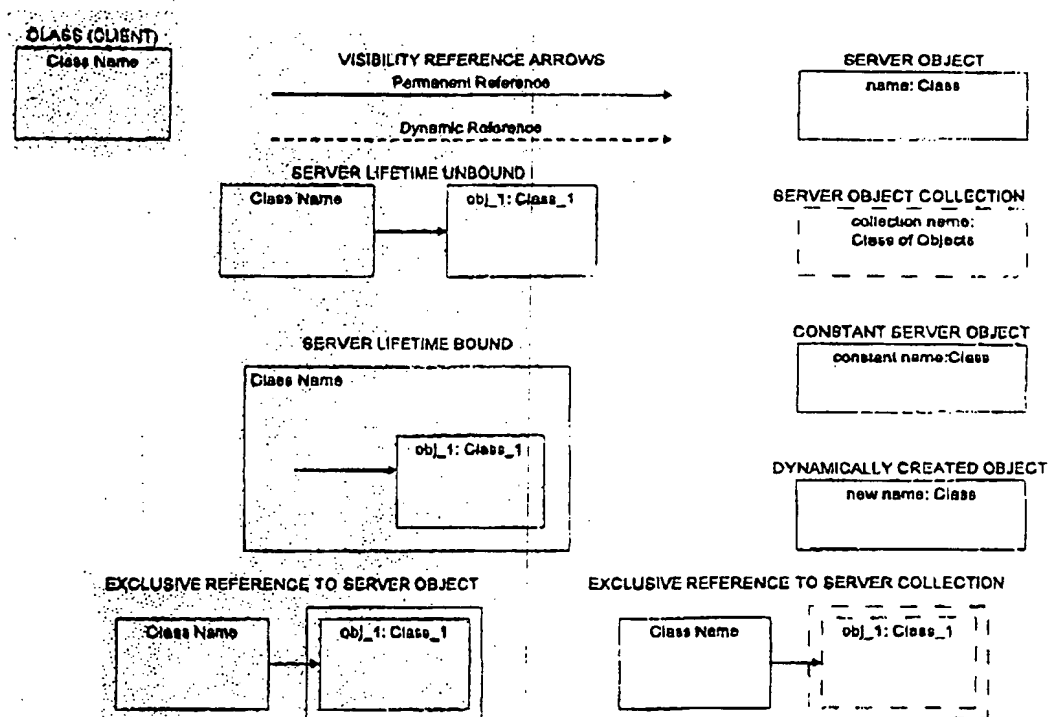


Fig. 58

**Visibility Graph Notation****Fig. 59**

**Class Description Notation:**

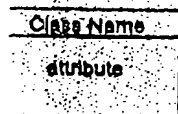
```
class <ClassName> [isa < SuperClassNames>]
  // for each attribute
  [attribute] [mutability] <a_name> :{sharing}[Binding] <Type>
  .
  .
  .
  // for each method
  [method] <m_name> <arglist>[:<Type>]
  .
  .
  .
endclass
```

**Fig. 60**

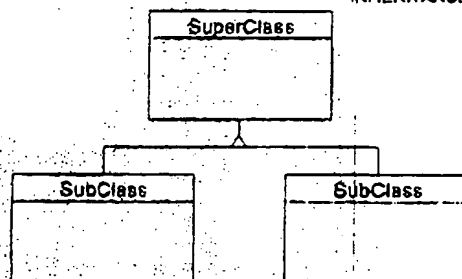
## Inheritance Graph Notation

## INHERITANCE GRAPH NOTATION

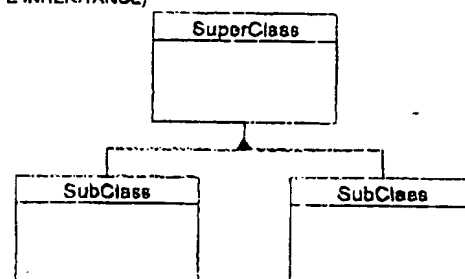
CLASS



INHERITANCE (SUBTYPE INHERITANCE)



Subclasses may overlap (nondescript)  
Possibly more classes.



Subclasses partition SuperClass

Fig. 61

62/81

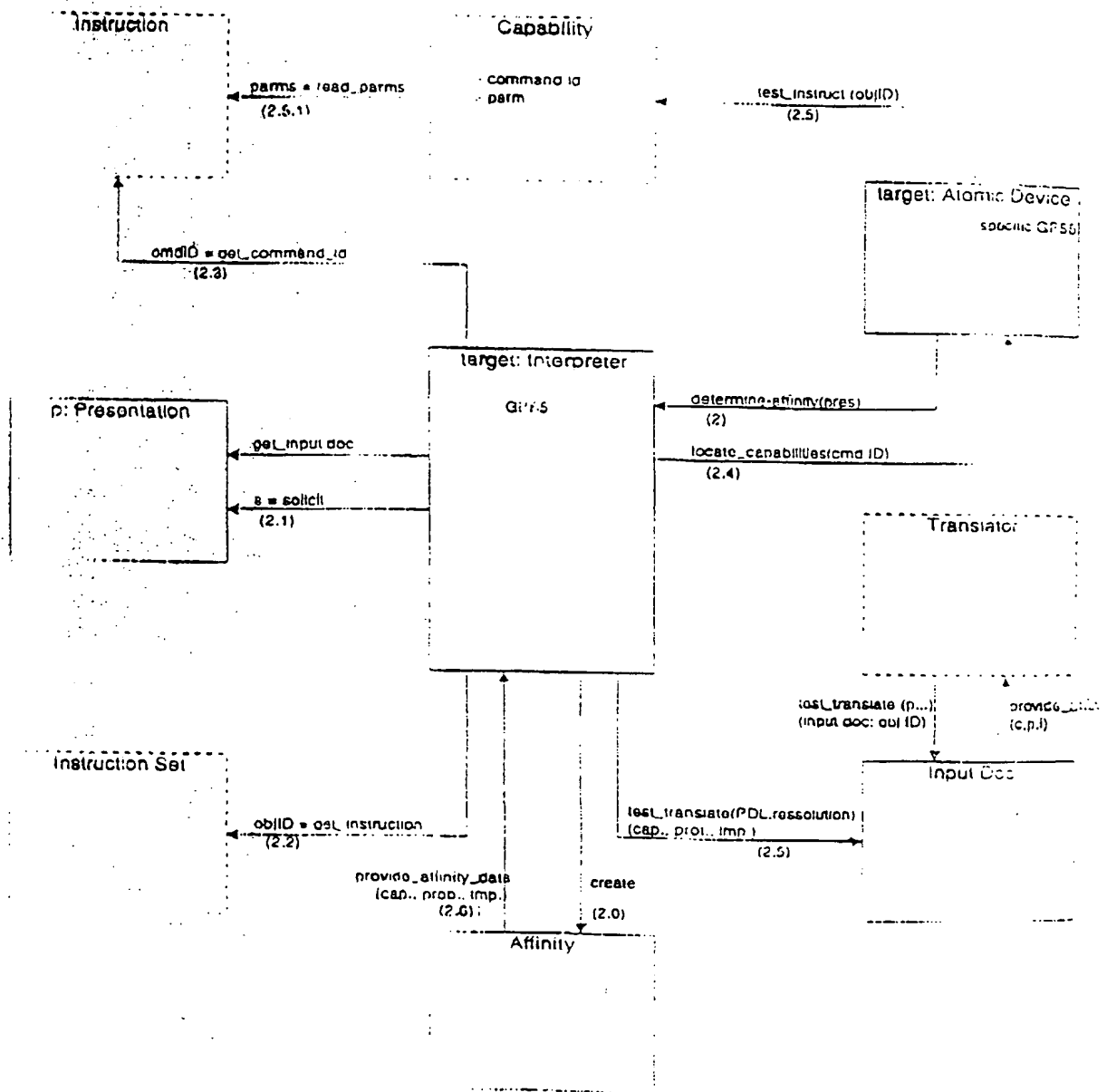


FIG. 62

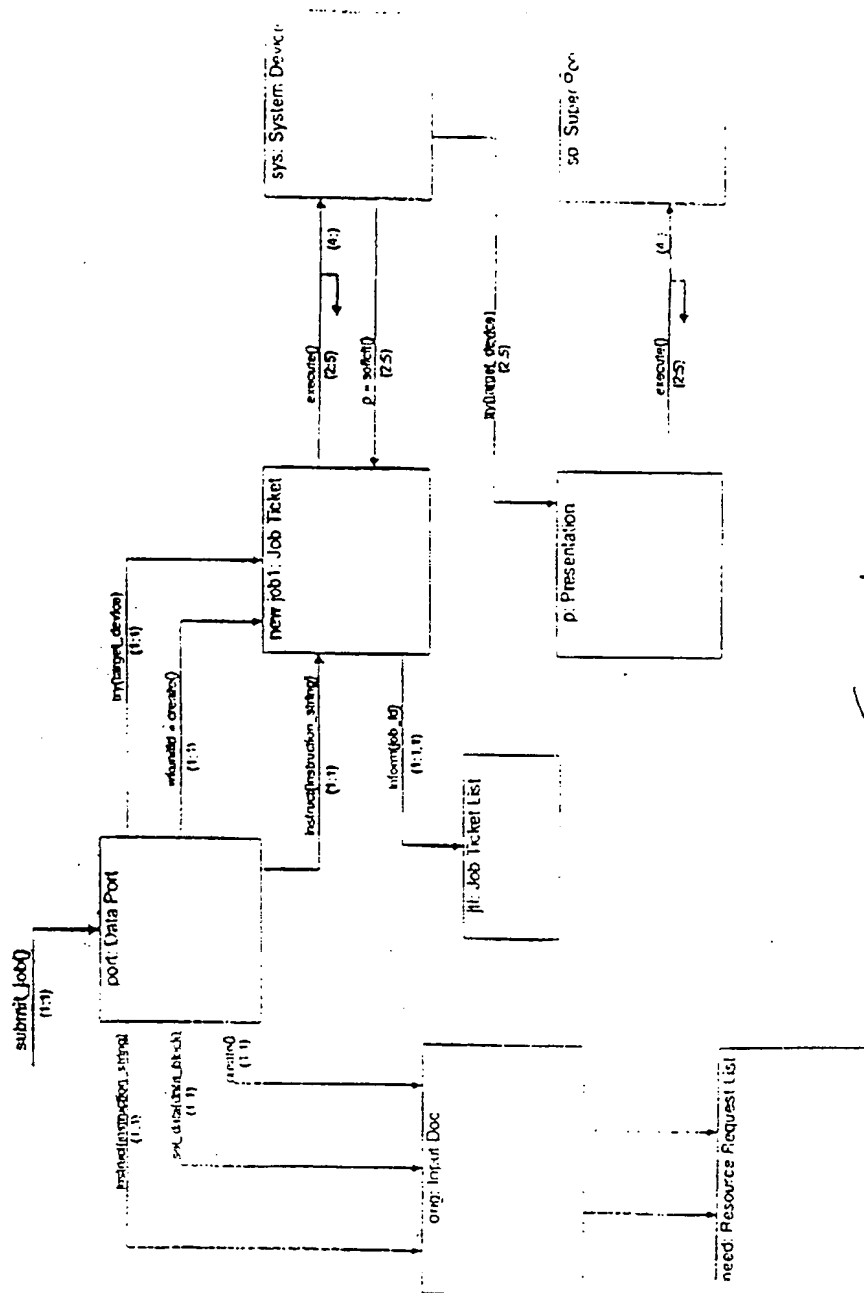


Fig. 63



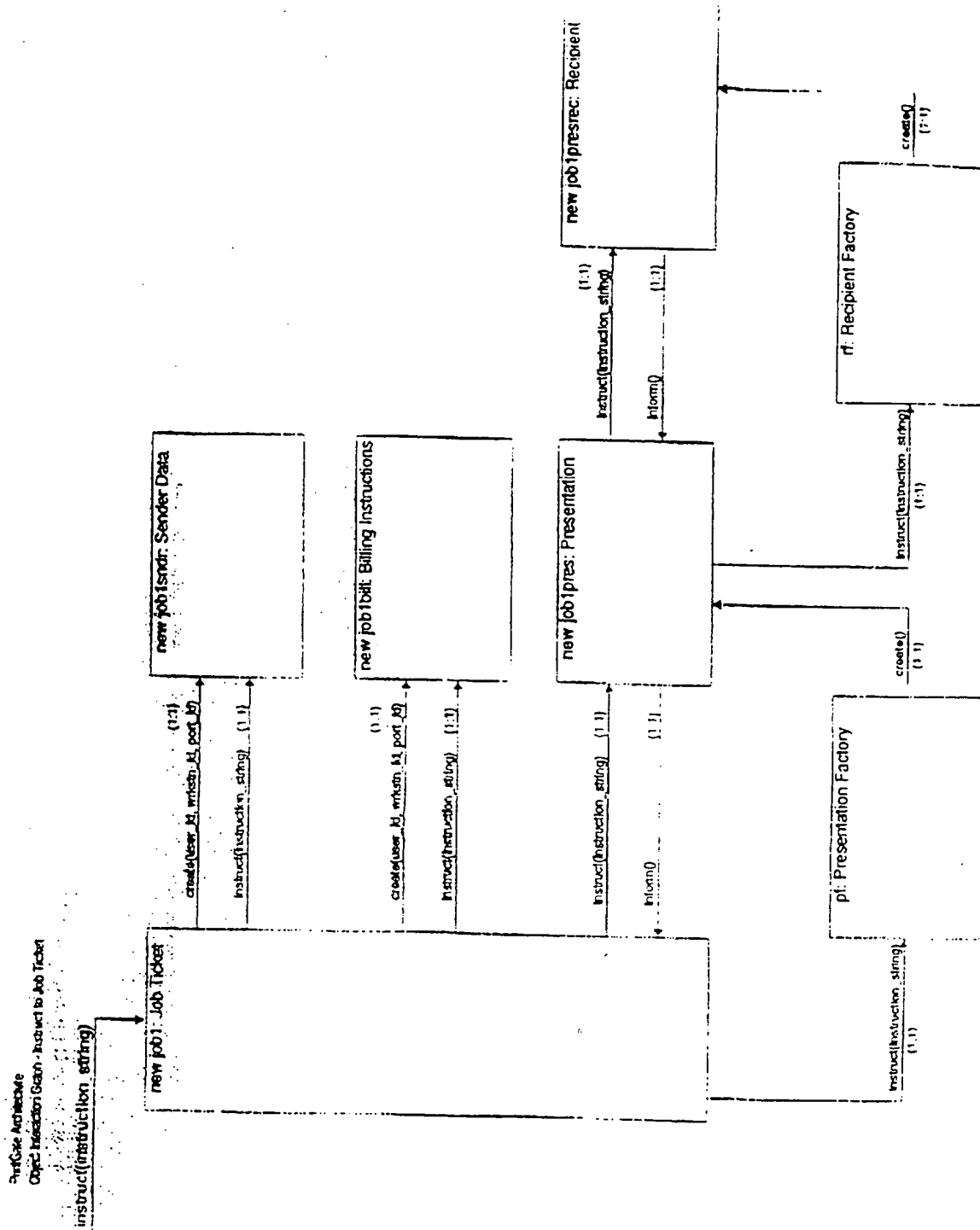
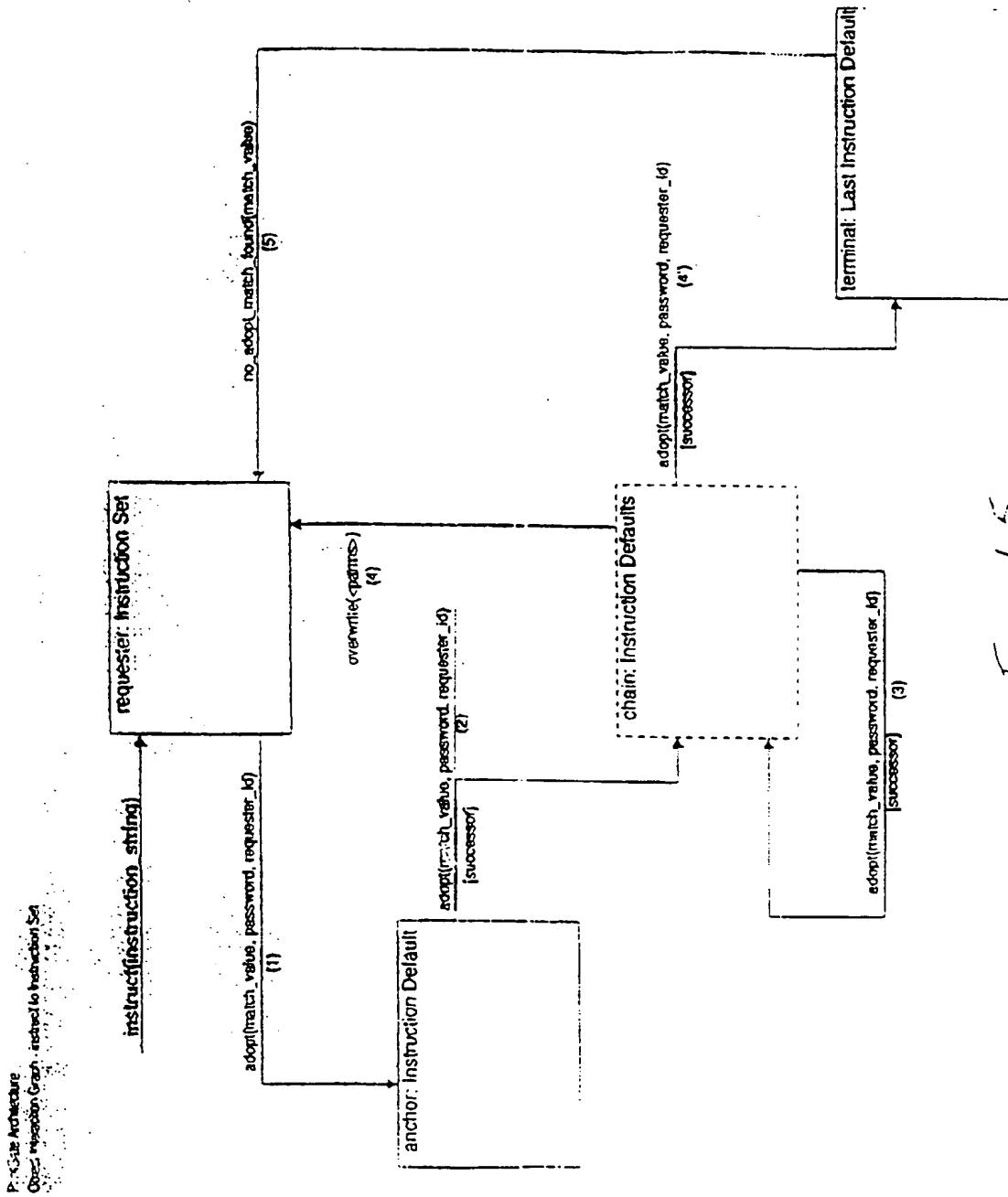
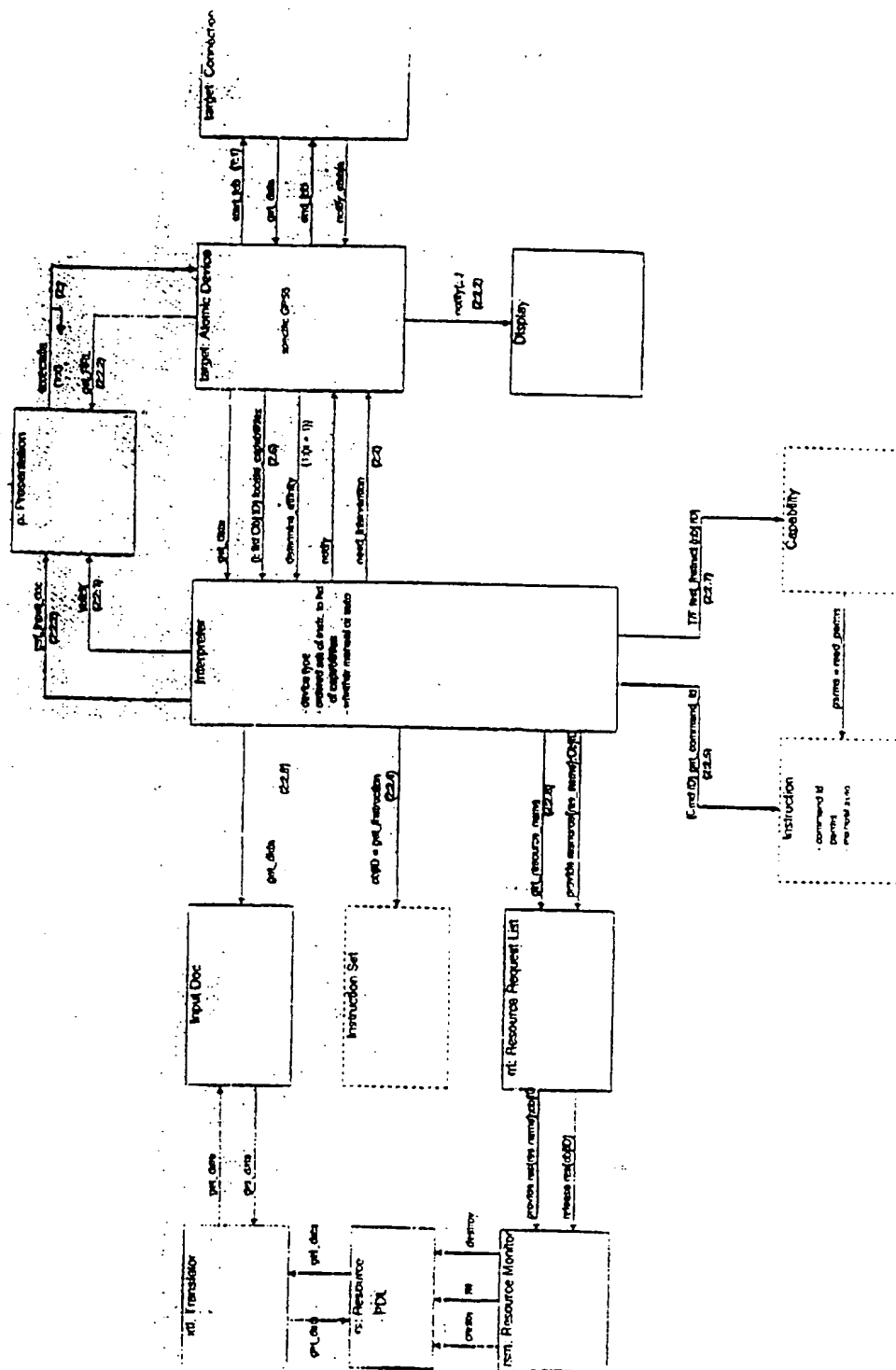


Fig. 64





F. H. 997

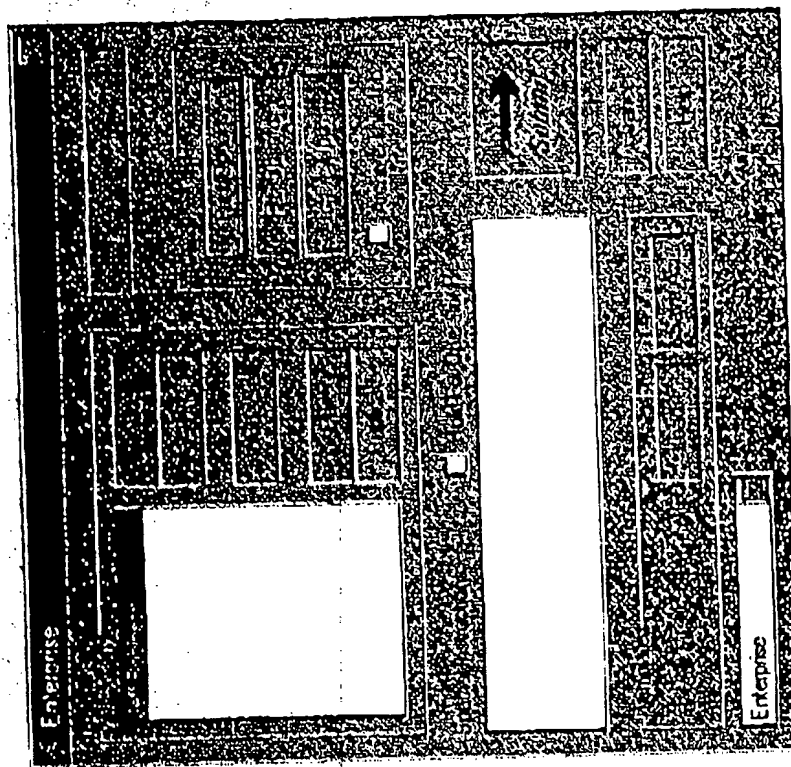


Fig. 67

<b>Recipient Information:</b>	
<b>Name:</b>	[REDACTED]
<b>Address:</b>	[REDACTED]
<b>City:</b>	[REDACTED]
<b>State:</b>	[REDACTED]
<b>Zip Code:</b>	[REDACTED]
<b>Phone Number:</b>	[REDACTED]
<b>E-mail Address:</b>	[REDACTED]
<b>Other Contact Info:</b>	[REDACTED]

Fig. 68

Recipient Information

First Name	Last Name	Address 1	Address 2	City	State	Zip	Country	Phone	Fax	Email

FIG. 69

Recipient Information

First Name: [ ] Last Name: [ ]

Address: [ ]

City: [ ] State: [ ] Zip: [ ]

Phone: [ ]

Service Type:

- ☐ Priority Overnight
- ☐ Standard Overnight
- ☐ 2nd Day
- ☐ Ground

Weight: [ ]

Volume: [ ]

Notes: [ ]

Tracking: ☐ Yes ☐ No

Signature: [ ]

Printed Name: [ ]

Signature: [ ]

Fig. 70

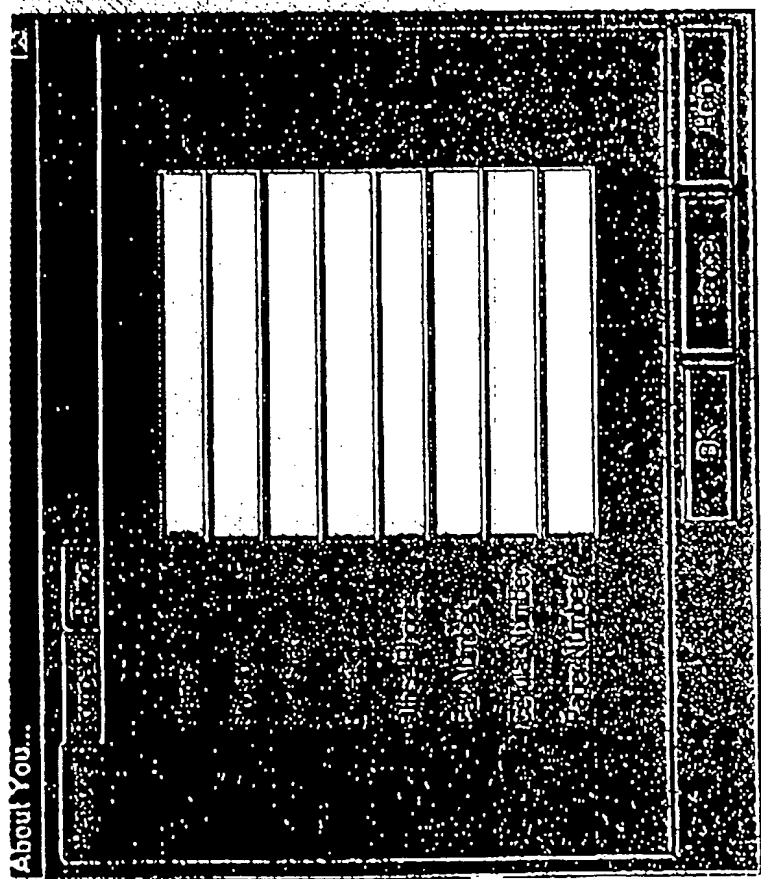


Fig. 71



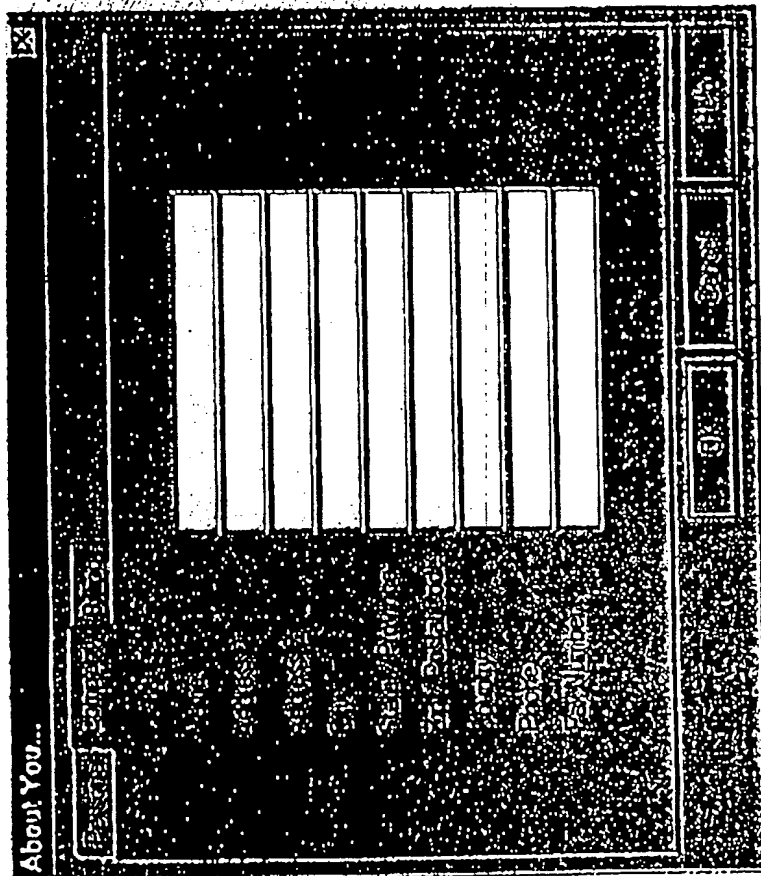


FIG. 72





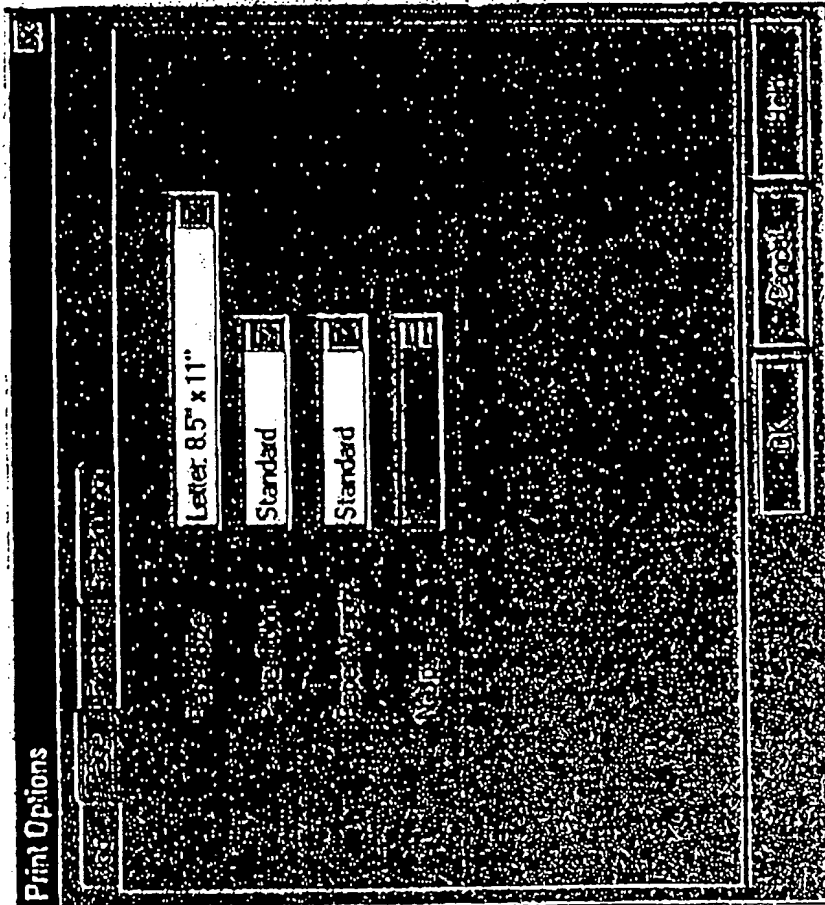


Fig. 75

[illegible]

Fig. 76

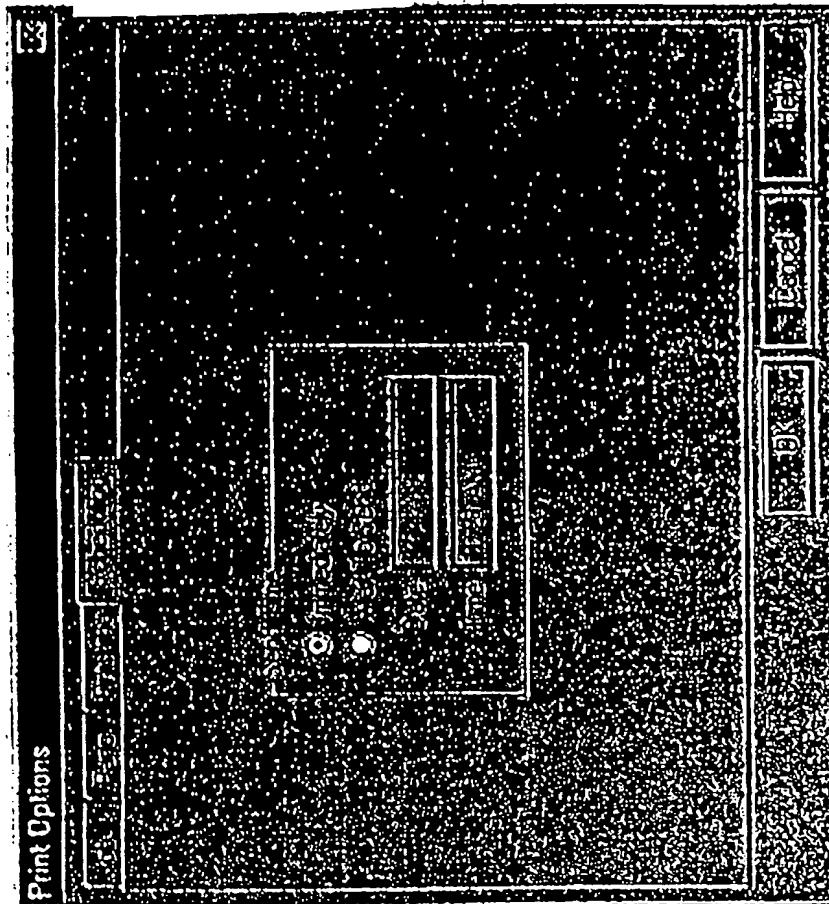


Fig. 96  
77



Fig. 78

79/81

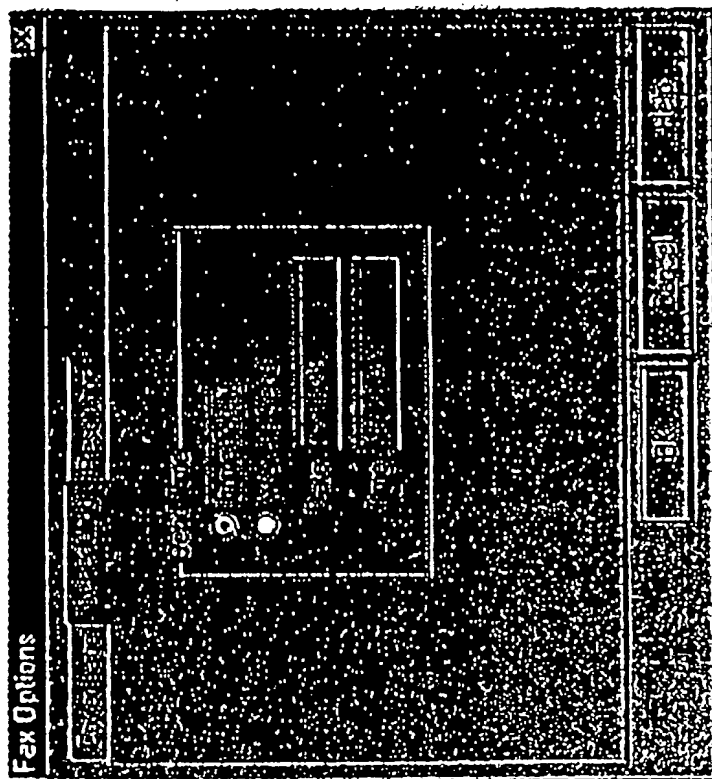


FIG. 79





Fig. 30



Fig. 90  
81

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US99/24482

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : G06F 17/21, 17/30

US CL : 707/526, 500

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 707/526, 500

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

West, Dialog, and IEEE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,701,500 A (IKEO ET AL.) 23 DECEMBER 1997, ALL	1-145
X	US 5,384,620 A (EBNER ET AL.) 24 JANUARY 1995, ALL	1-74
X	US 5,402,527 A (BIGBY ET AL.) 28 MARCH 1995, ALL	1-145
X	US 5,715,379 A (PAVLOVIC ET AL.) 03 FEBRUARY 1998, ALL	1-145



Further documents are listed in the continuation of Box C.



See patent family annex.

\* Special categories of cited documents:

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\*

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\*

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\*

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

\*&amp;\*

document member of the same patent family

Date of the actual completion of the international search

15 DECEMBER 1999

Date of mailing of the international search report

01 FEB 2000

Name and mailing address of the ISA/US  
Commissioner of Patents and Trademarks  
Box PCT  
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

ALFORD KINDRED

Telephone No. (703) 305-3900

**THIS PAGE BLANK (USPTO)**